

# UPDES Permit for Discharge of Reverse Osmosis By-product to Great Salt Lake



SOUTHWEST  
**GROUNDWATER**  
TREATMENT PLANT

Mark Atencio  
March 2010



JORDAN VALLEY WATER  
CONSERVANCY DISTRICT

*Delivering Quality Every Day*

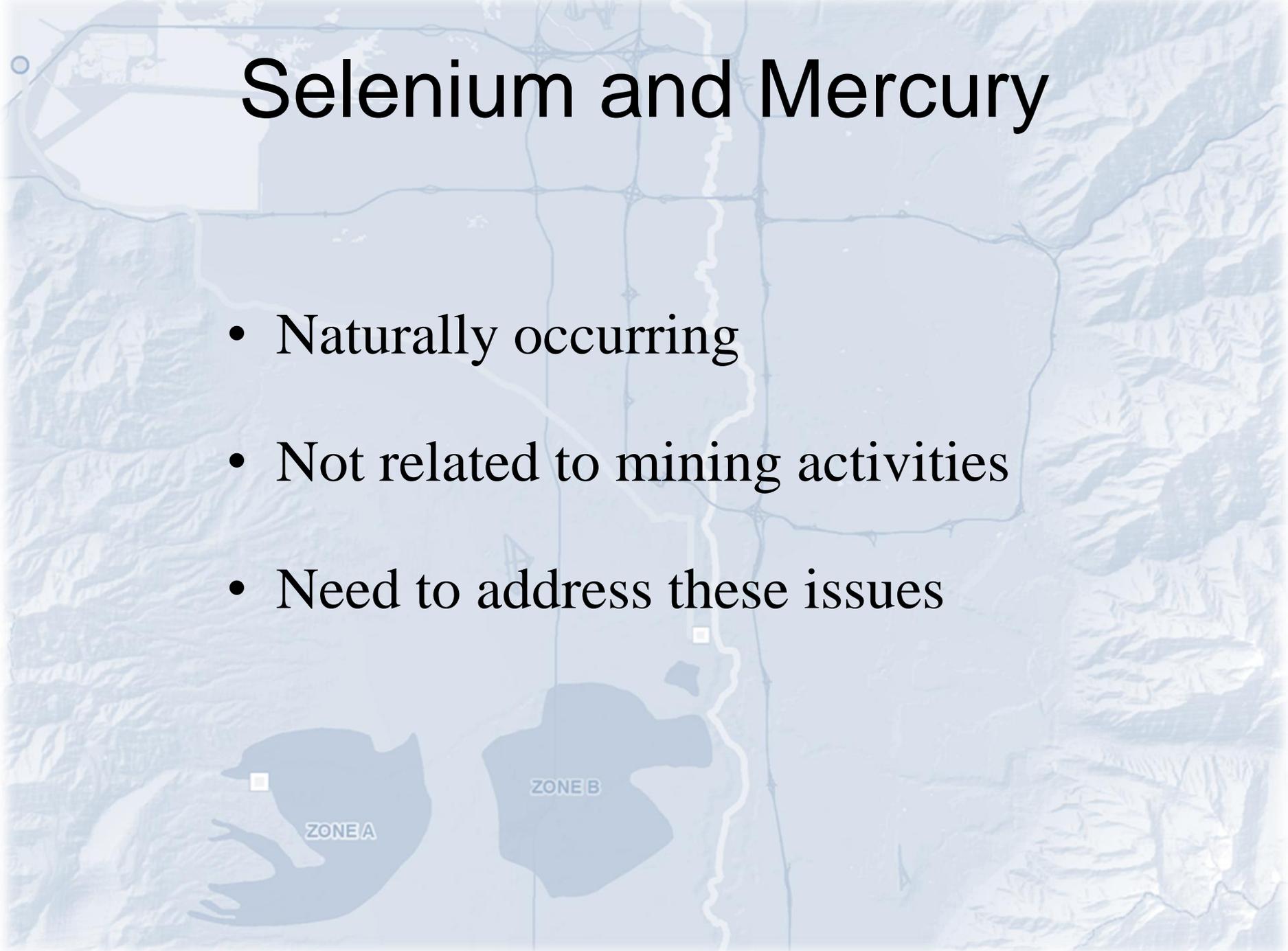
# Sulfate (mg/L)

Plume	Secondary Drinking Water Standard	Great Salt Lake
800	250	7,000



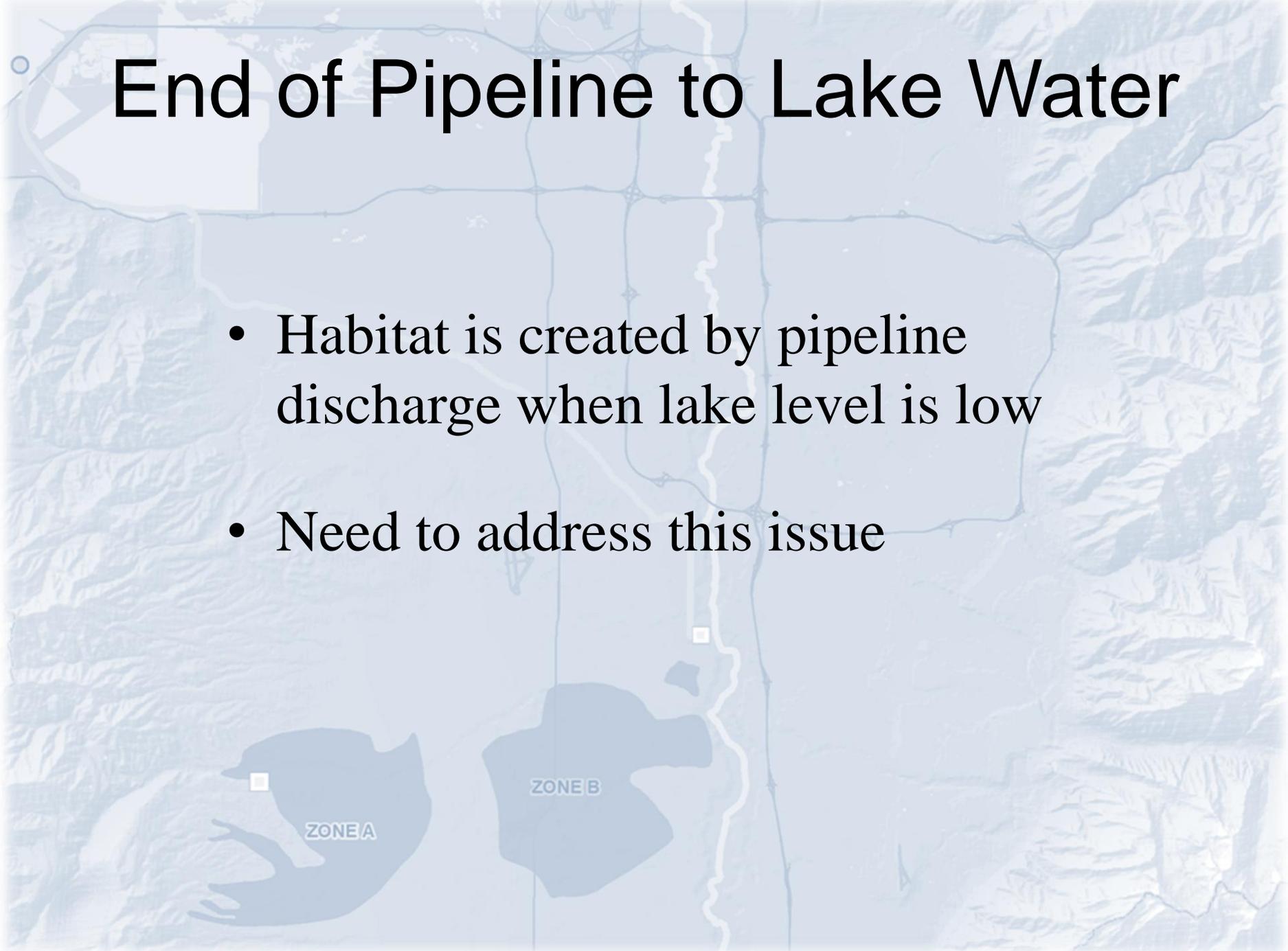
# Selenium and Mercury

- Naturally occurring
- Not related to mining activities
- Need to address these issues



# End of Pipeline to Lake Water

- Habitat is created by pipeline discharge when lake level is low
- Need to address this issue



Plumes Exist –  
Groundwater is Unusable



# Project Accomplishes

- Sulfate contained and relocated
- Drinking water produced
- Aquifer remediated



One of Great Salt Lake's  
Beneficial Uses:  
water-oriented wildlife  
and their necessary  
food chain



Anticipated  
permit limits  
structured to  
protect  
wildlife

Photo by CDSD

# Presentation Information

- Water quality
- Discharge scenarios
- Pipeline alignment
- Discharge location
- Monitoring expectation

# Water Quality



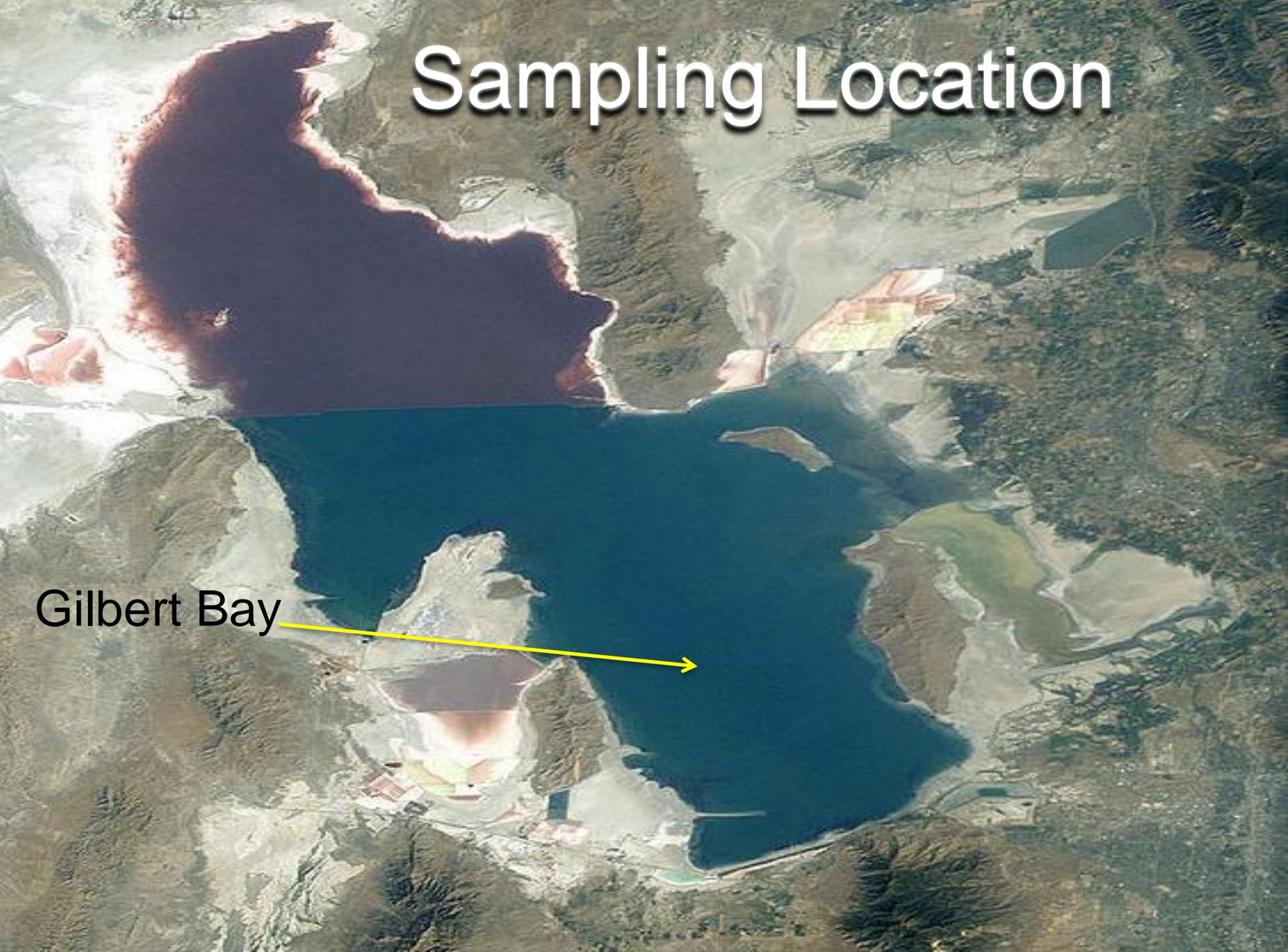
# Total Dissolved Solids (TDS) (mg/L – ppm)

JVWCD Discharge	Existing Gilbert Bay	Existing Jordan River	Secondary Drinking Water Standard
10,746	80,000 – 100,000	1,100	500



# Sampling Location

Gilbert Bay



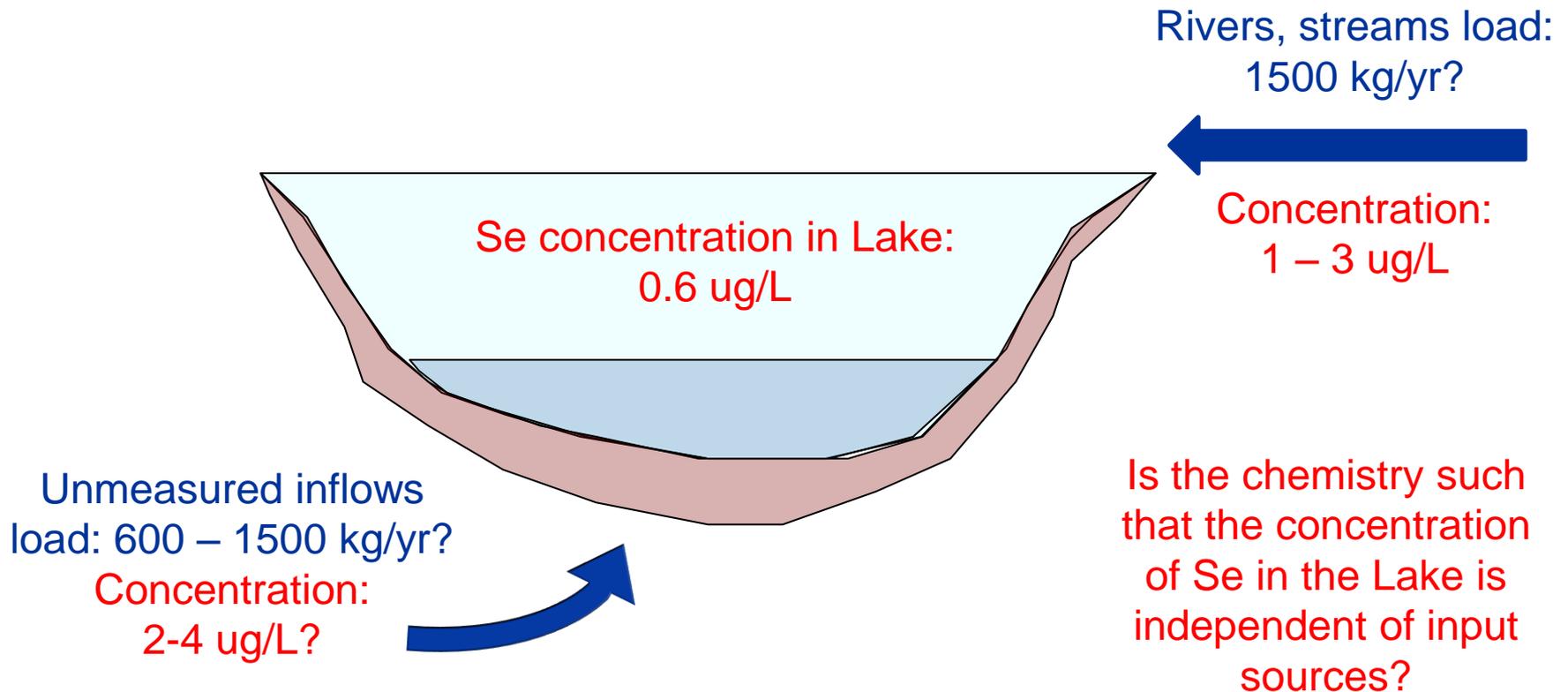
# Selenium (ug/L - ppb)

JVWCD Discharge	Existing Gilbert Bay	Existing Jordan River	Primary Drinking Water Standard
55	0.6	2	50



# Project 3

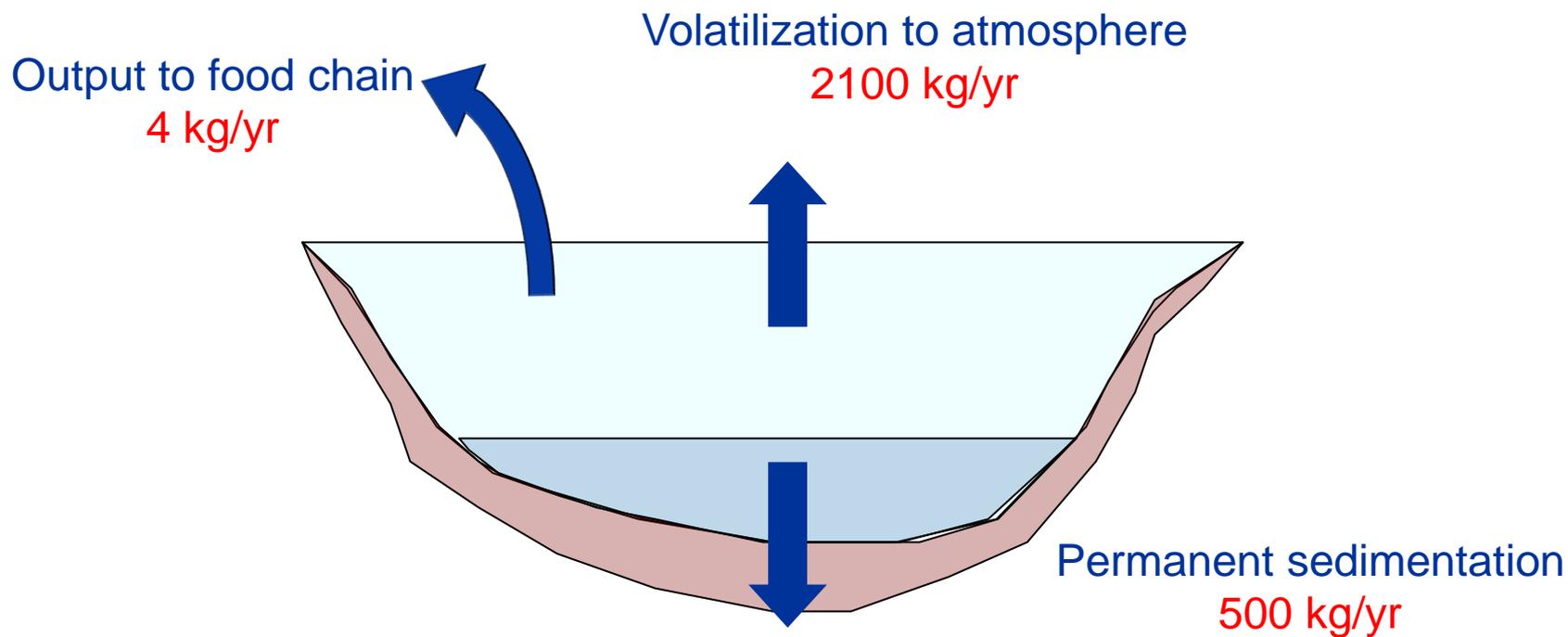
## Selenium Loads to Great Salt Lake



Thanks to DEQ for this information

# Project 4

## Selenium Flux (Transport and Fate)



Thanks to DEQ for this information

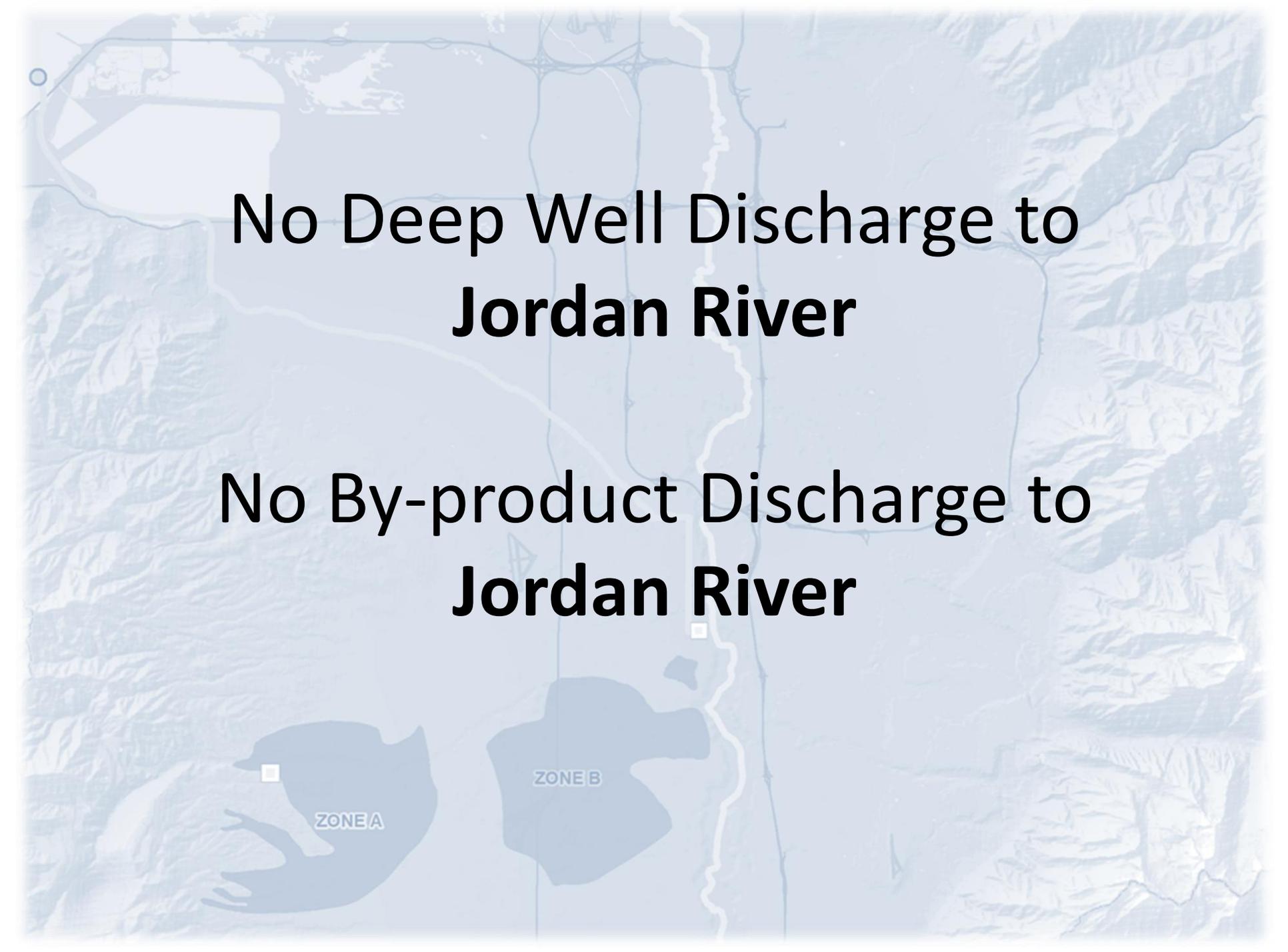
# Mercury (ug/L - ppb)

JVWCD Discharge	Existing Gilbert Bay	Farmington Bay	Goggin Drain	Lee Creek
.030-.070	.007-.045	.00742	.00441	.00426

Thanks to  for guidance,  
new data, and data interpretation.

# Discharge Scenarios



A topographic map of a region, likely in the western United States, showing a river flowing from the top right towards the bottom center. The terrain is rugged with many ridges and valleys. Two areas are highlighted in a darker blue color: 'ZONE A' is a large, irregularly shaped area on the left side, and 'ZONE B' is a smaller, more compact area to its right. A small white square is located within Zone A, and another is on the riverbank near Zone B. The text 'No Deep Well Discharge to Jordan River' is centered over the upper part of the map.

**No Deep Well Discharge to  
Jordan River**

**No By-product Discharge to  
Jordan River**

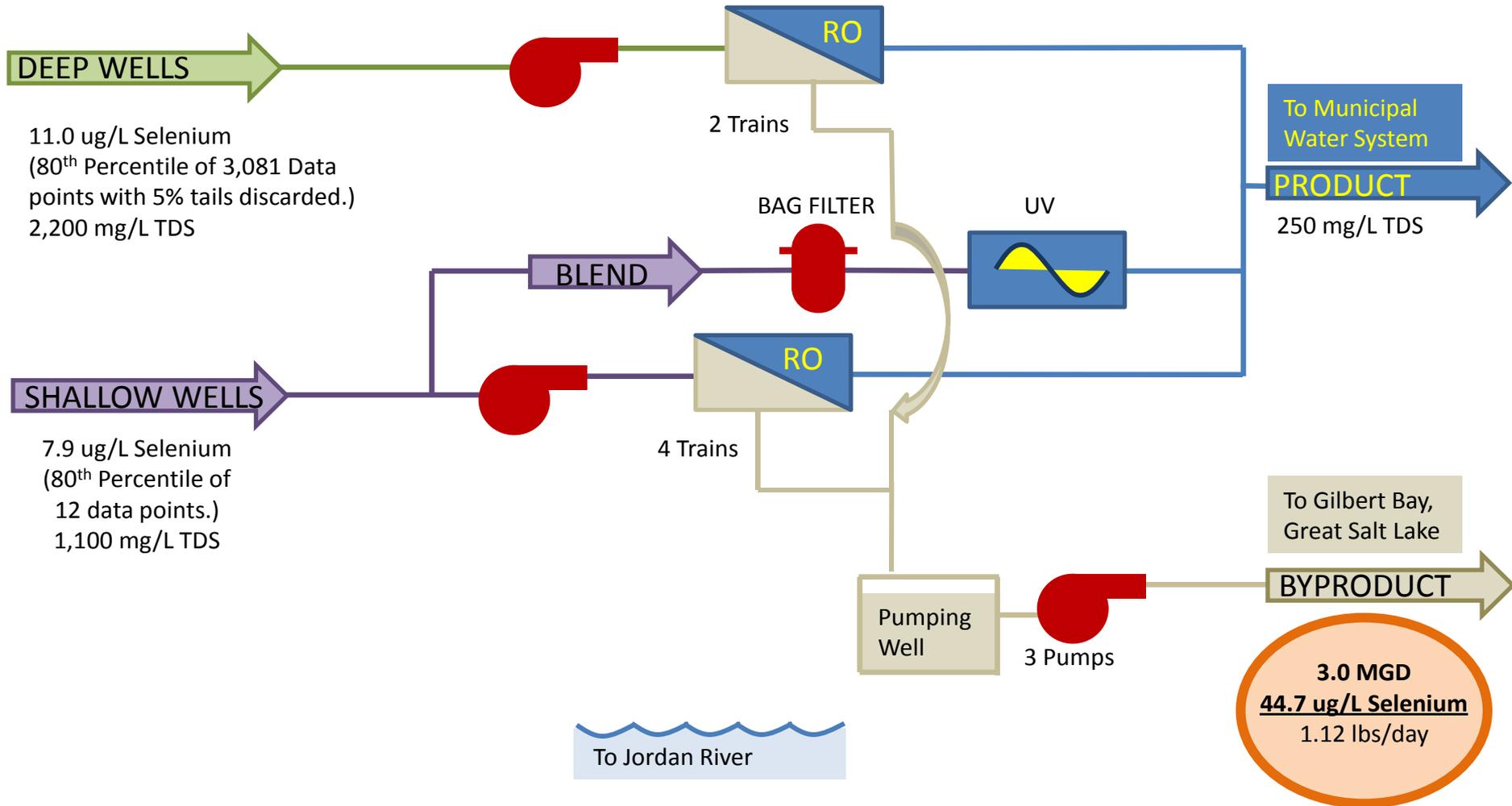
A topographic map of the Great Salt Lake region, showing the lake's outline and surrounding terrain. Two specific discharge points are marked with small white squares: one in the western part of the lake labeled 'ZONE A' and another in the eastern part labeled 'ZONE B'. The map is overlaid with a semi-transparent blue filter.

**Deep Well Discharge to  
Great Salt Lake**

**By-product Discharge to  
Great Salt Lake**

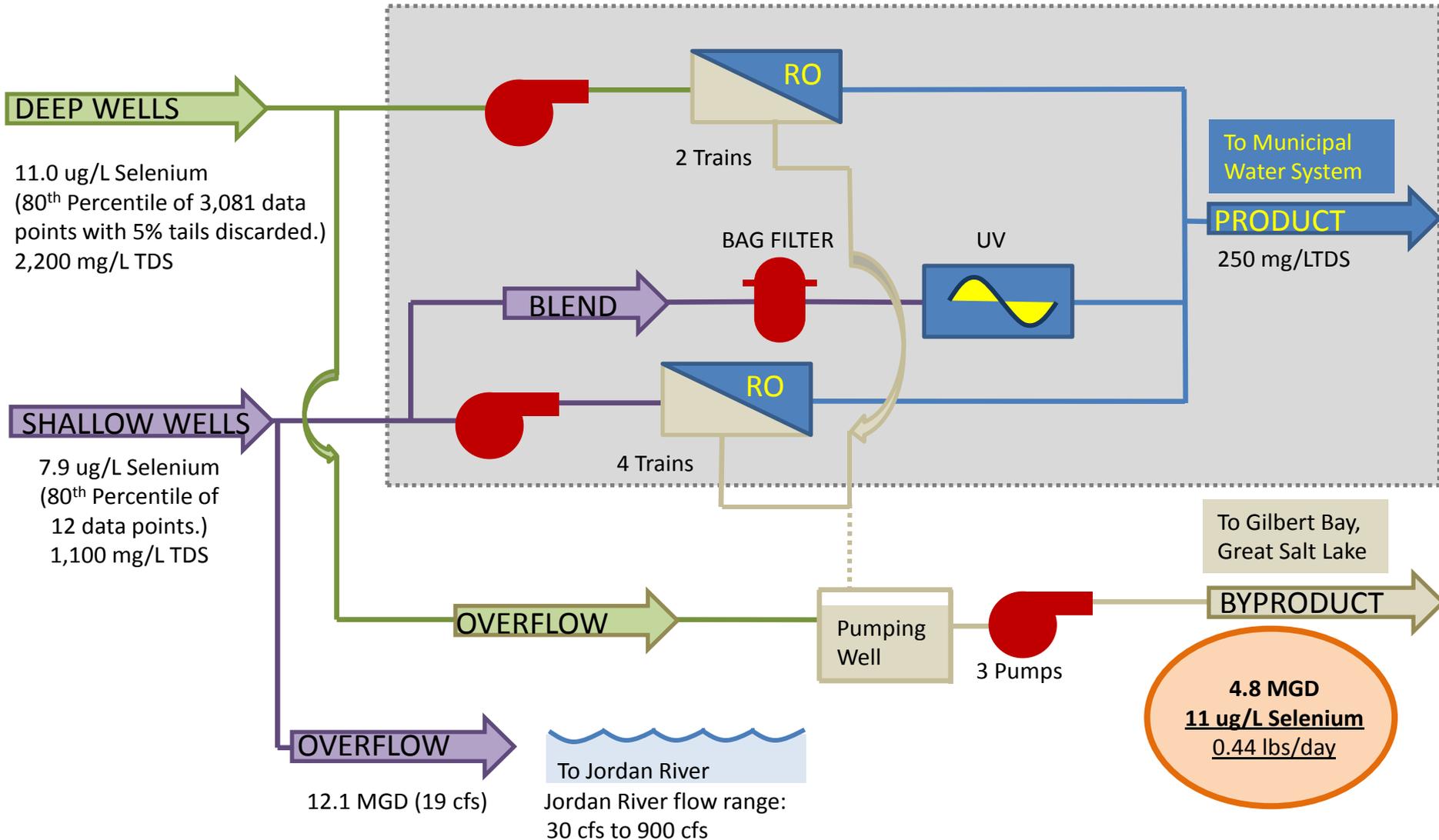
# PROCESS FLOW DIAGRAM

## Normal Operation



# PROCESS FLOW DIAGRAM

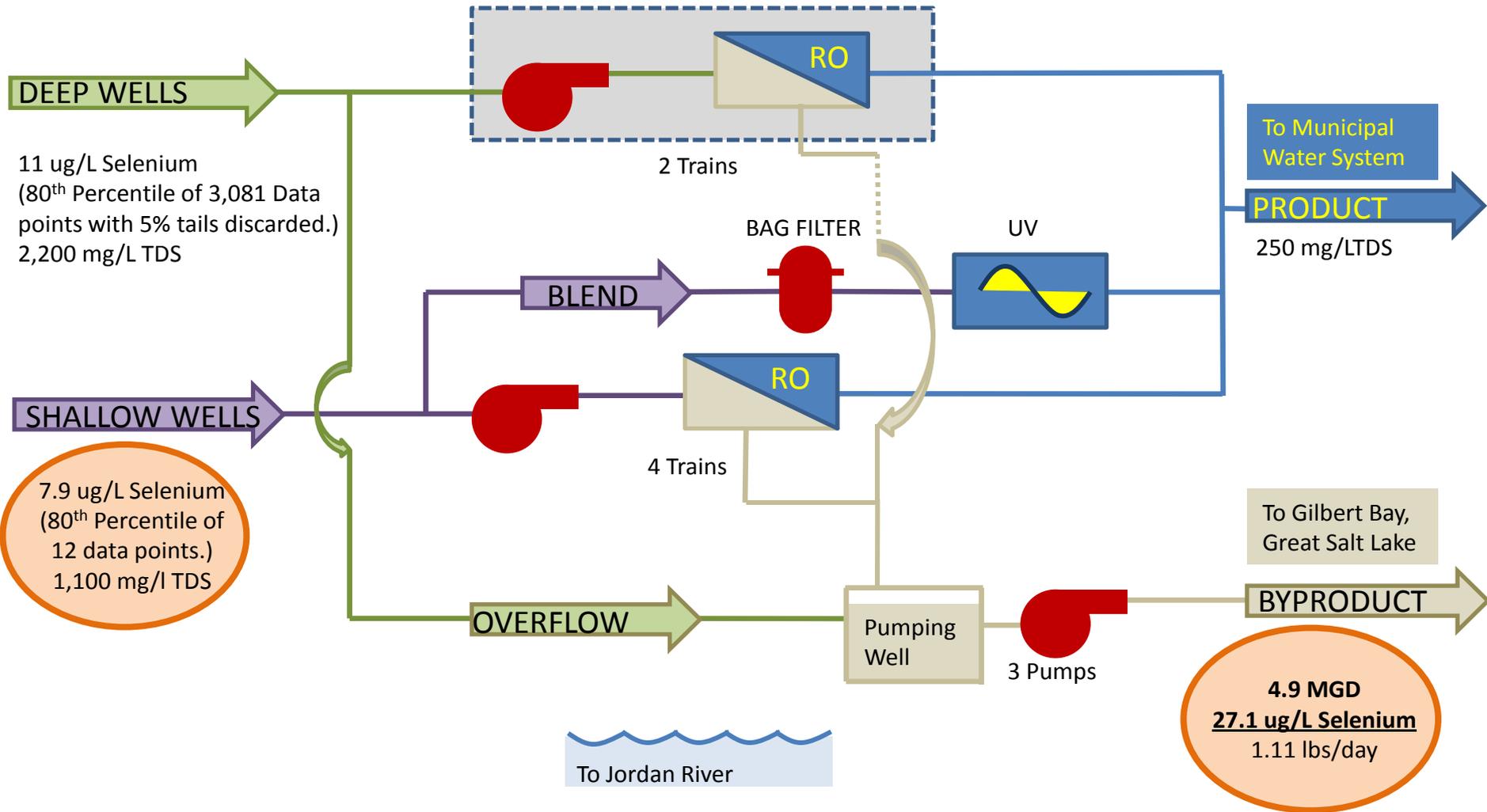
## Start-up



Scenario will occur during initial start-up and after power failure for approximately a 24 hour period

# PROCESS FLOW DIAGRAM

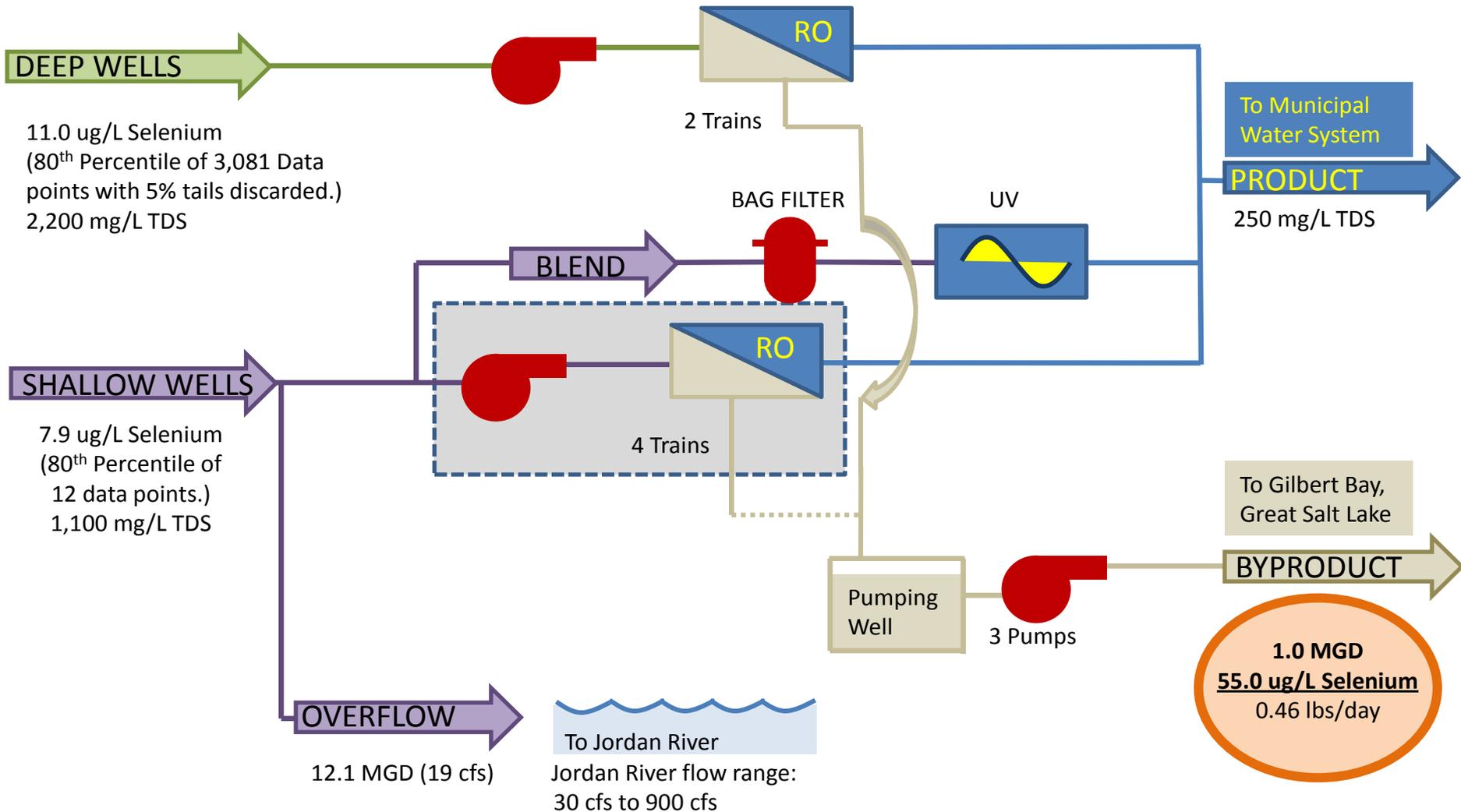
## Cleaning and Maintenance Deep RO



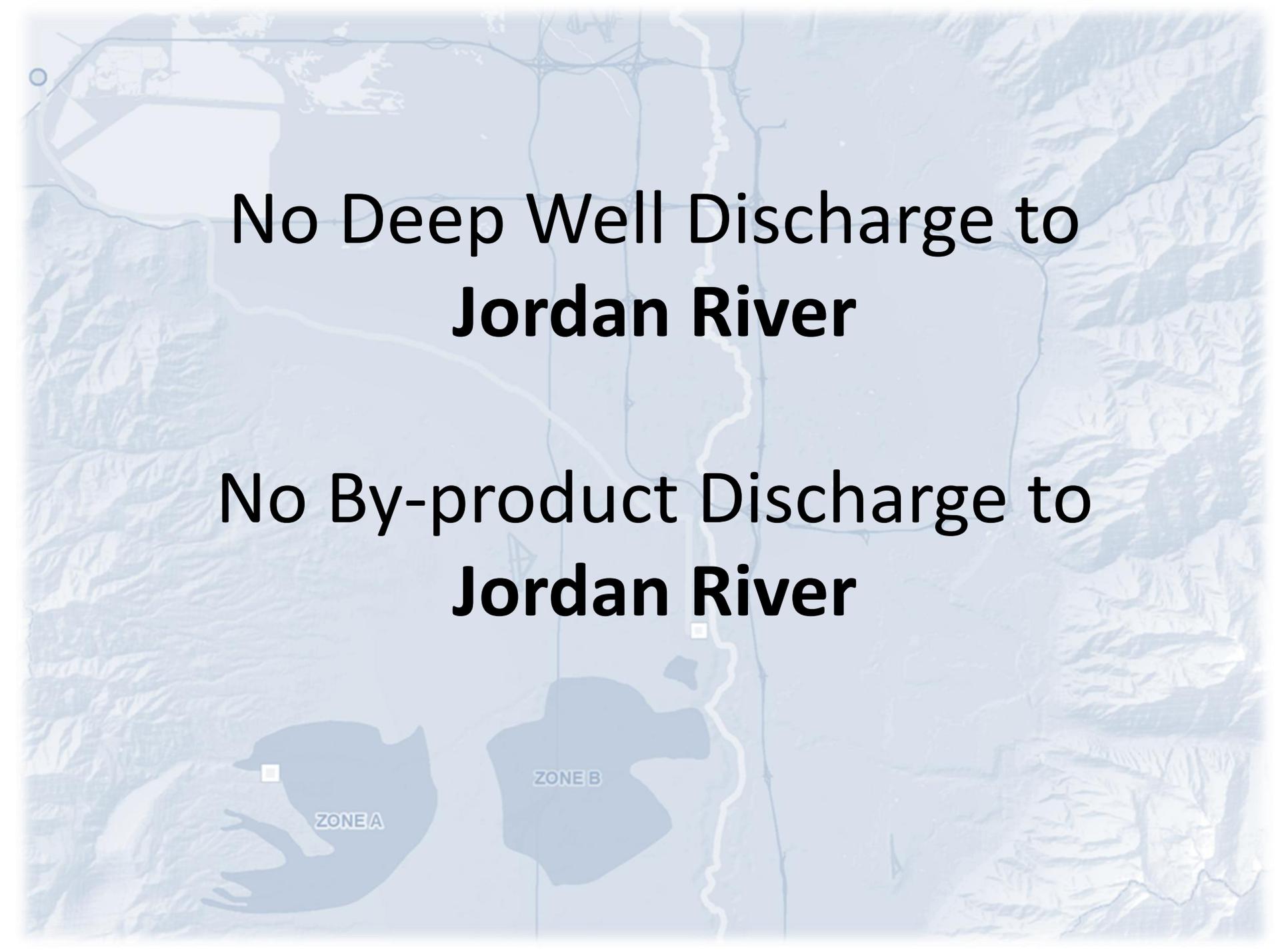
Scenario will occur every three months  
for approximately a 24 hour period

# PROCESS FLOW DIAGRAM

## Cleaning & Maintenance Shallow RO

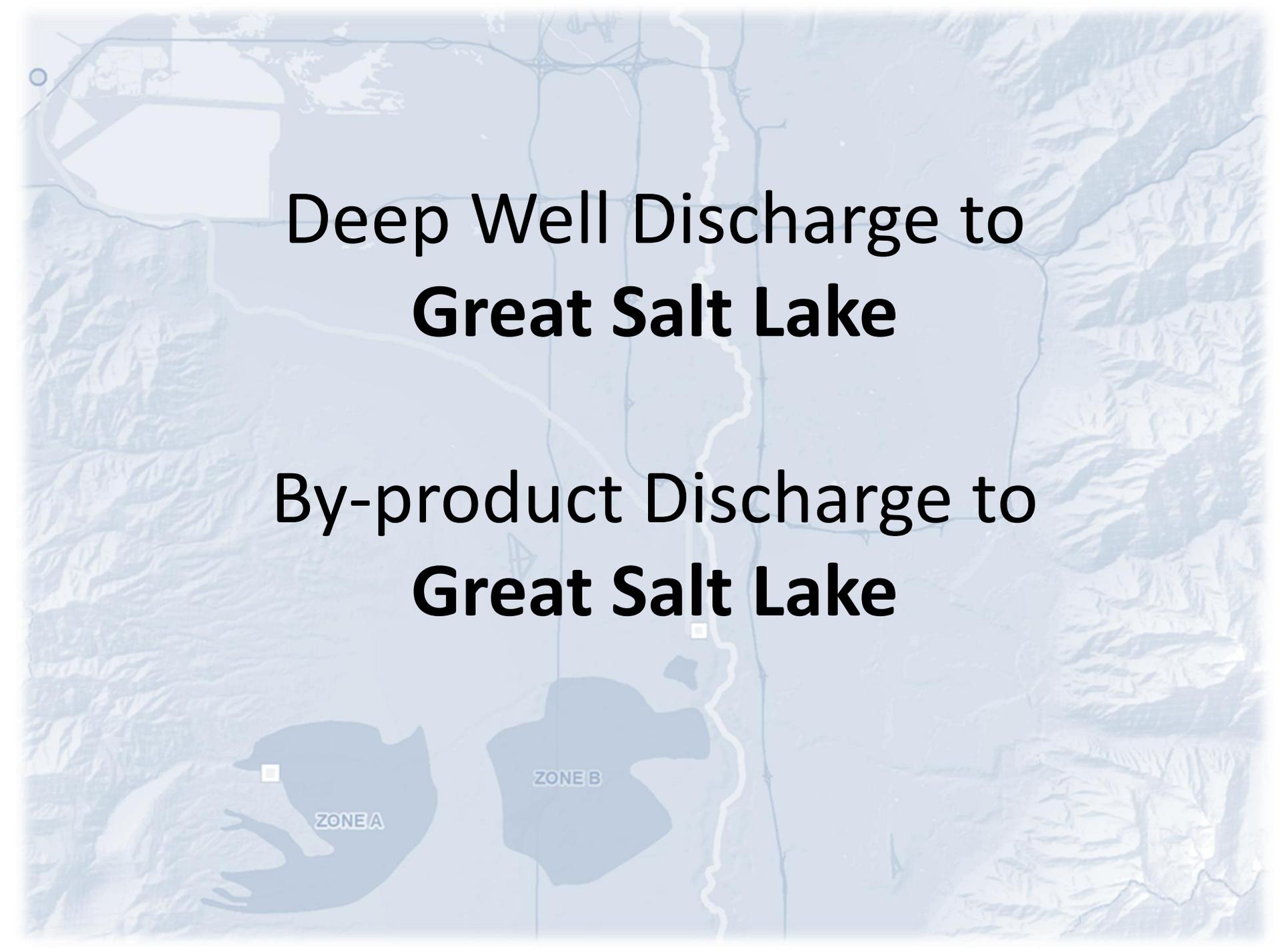


Scenario will occur every three months  
for approximately a 24 hour period

A topographic map of a region, likely in the western United States, showing a river system. The map is overlaid with a semi-transparent blue layer. Two areas are highlighted in a darker blue: 'ZONE A' on the left and 'ZONE B' in the center. A river flows from the top right towards the bottom right. A road network is visible in the upper left. A small white square is located on the river in the lower right. The text 'No Deep Well Discharge to Jordan River' is centered in the upper half of the map.

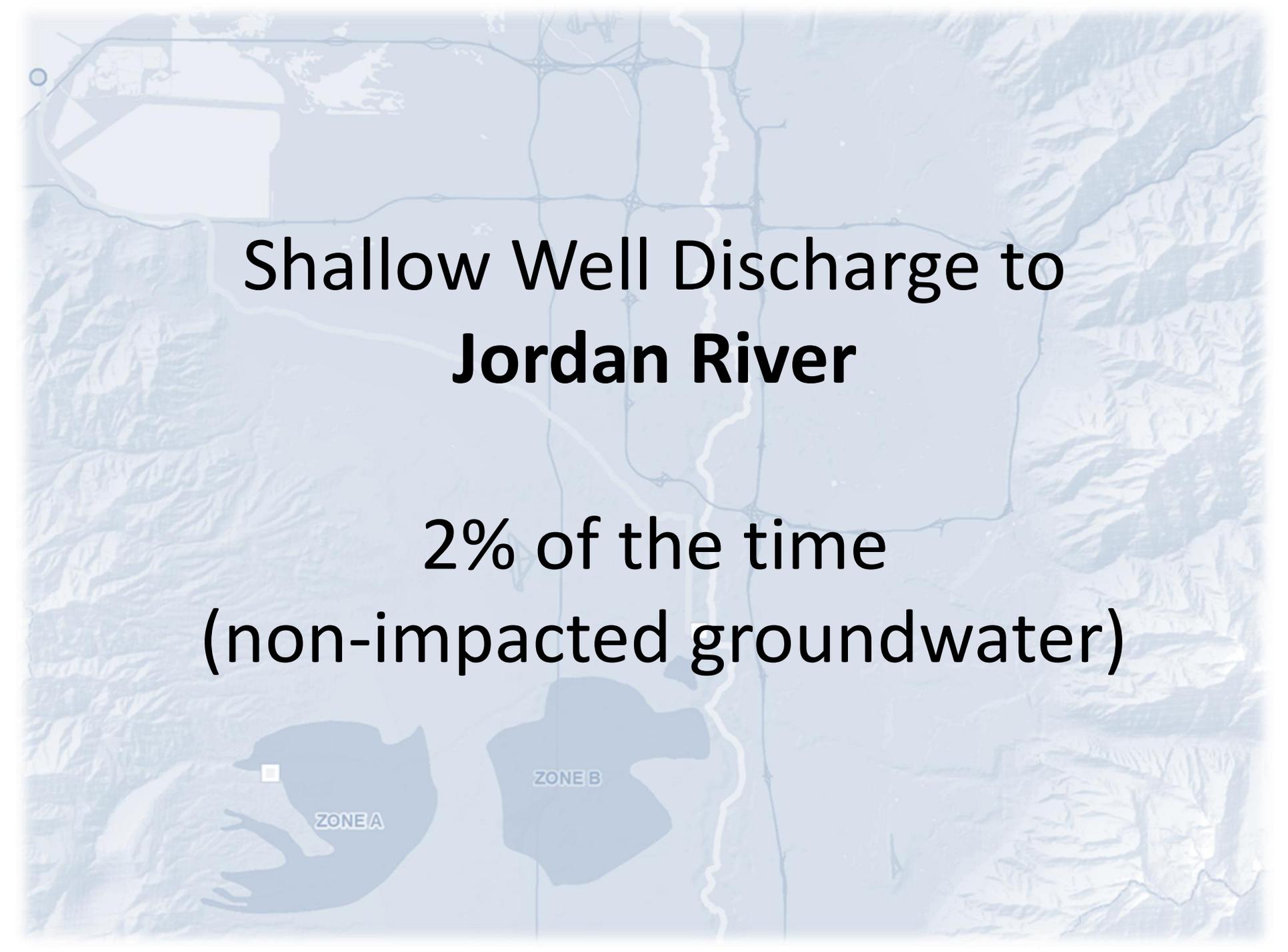
**No Deep Well Discharge to  
Jordan River**

**No By-product Discharge to  
Jordan River**

A topographic map of the Great Salt Lake region, showing the lake's outline and surrounding terrain. Two specific discharge points are marked with small white squares: one in the western part of the lake labeled 'ZONE A' and another in the eastern part labeled 'ZONE B'. The map is overlaid with a semi-transparent blue filter.

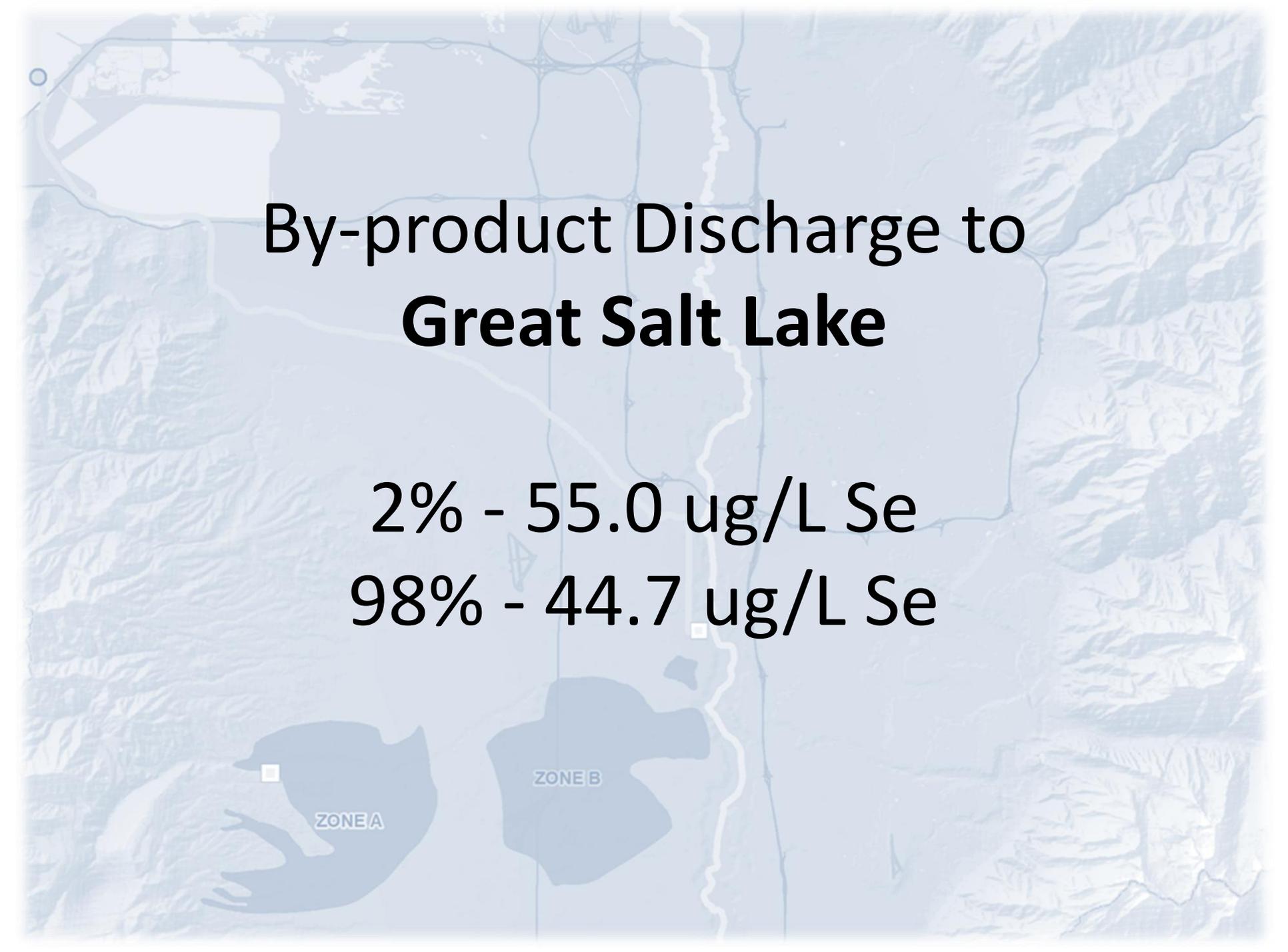
# Deep Well Discharge to Great Salt Lake

# By-product Discharge to Great Salt Lake

A topographic map of a region, likely in the western United States, showing a river system. The map is overlaid with a grid of roads and features two shaded study areas labeled 'ZONE A' and 'ZONE B'. A small white square is located within Zone A. The text 'Shallow Well Discharge to Jordan River' is centered on the map.

# Shallow Well Discharge to Jordan River

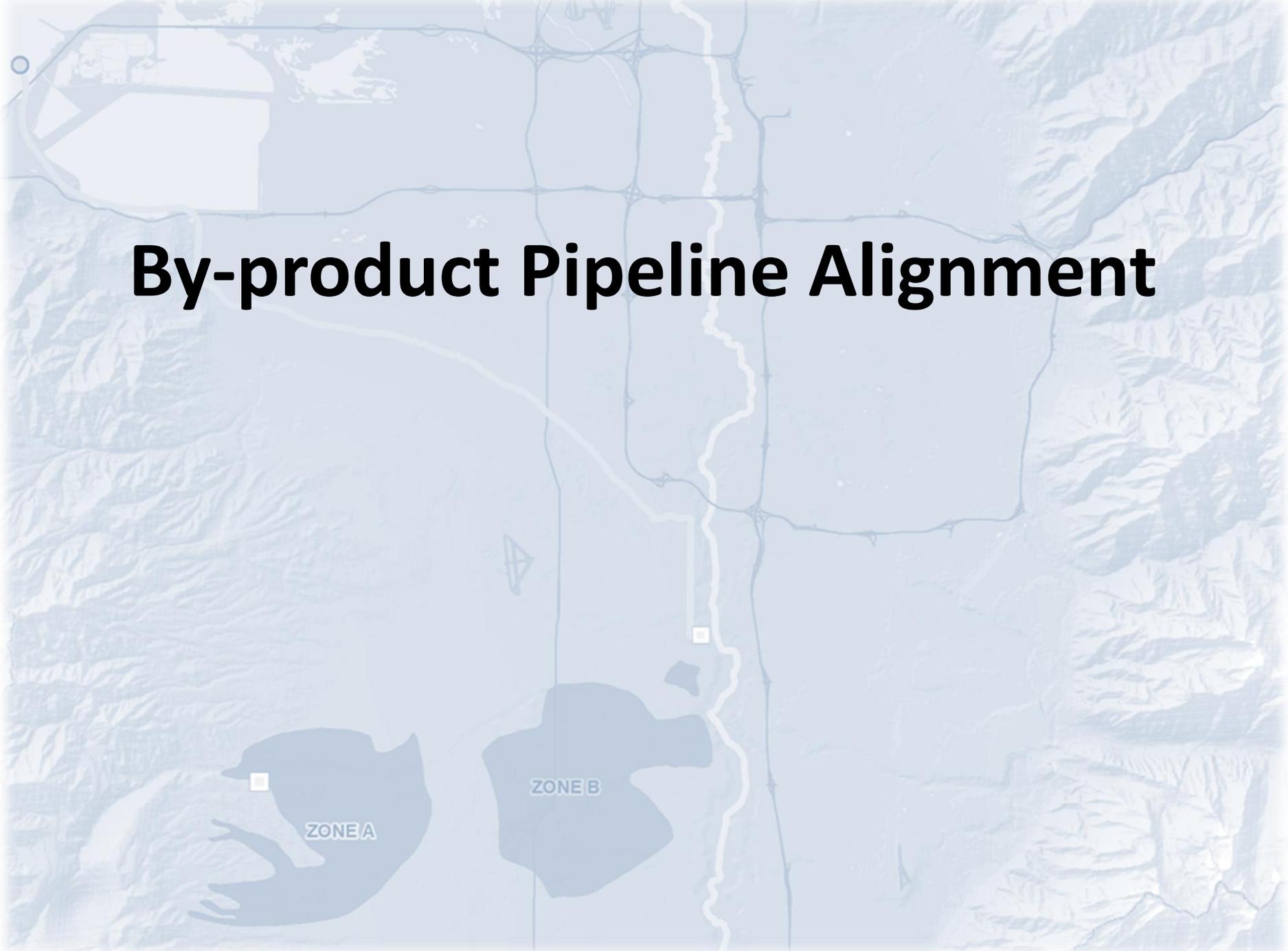
2% of the time  
(non-impacted groundwater)

A topographic map of the Great Salt Lake region, showing the lake's outline and surrounding terrain. Two sampling zones are highlighted in dark blue: 'ZONE A' on the western shore and 'ZONE B' on the eastern shore. A white line representing a discharge path runs from the top center towards the lake. Two small white squares indicate discharge points: one on the western shore near Zone A and one on the eastern shore near Zone B. The text 'By-product Discharge to Great Salt Lake' is overlaid in the upper center, and selenium concentration data is overlaid in the lower center.

# By-product Discharge to Great Salt Lake

2% - 55.0  $\mu\text{g}/\text{L}$  Se  
98% - 44.7  $\mu\text{g}/\text{L}$  Se

# By-product Pipeline Alignment



GREAT SALT LAKE

**BYPRODUCT DISCHARGE  
TO GREAT SALT LAKE**

KENNECOTT  
TAILINGS POND

SALT LAKE CITY

MAGNA

WEST VALLEY

SOUTH  
SALT LAKE

KEARNS

TAYLORSVILLE

MURRAY

WEST JORDAN

**TREATED WATER  
TO JORDAN  
AQUEDUCT**

MIDVALE

**SWGTP  
8300 S. 1000 W.  
West Jordan**

SANDY

WHITE  
CITY

SOUTH JORDAN

Surplus Canal

River Canal

BANGERTER HIGHWAY

JORDAN AQUEDUCT

I-215

I-80

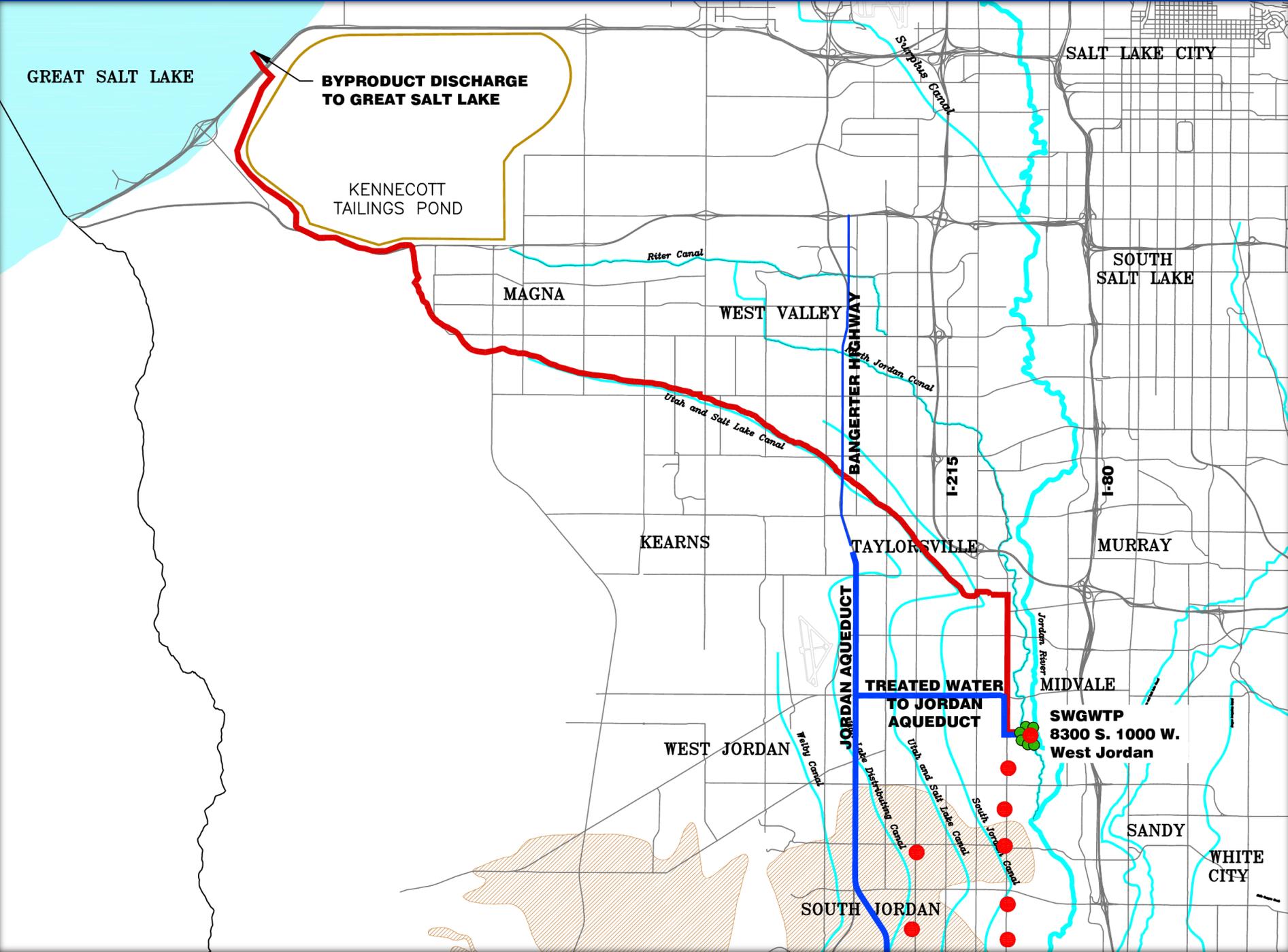
West Canal

Utah Ditch Distributing Canal

Utah and Salt Lake Canal

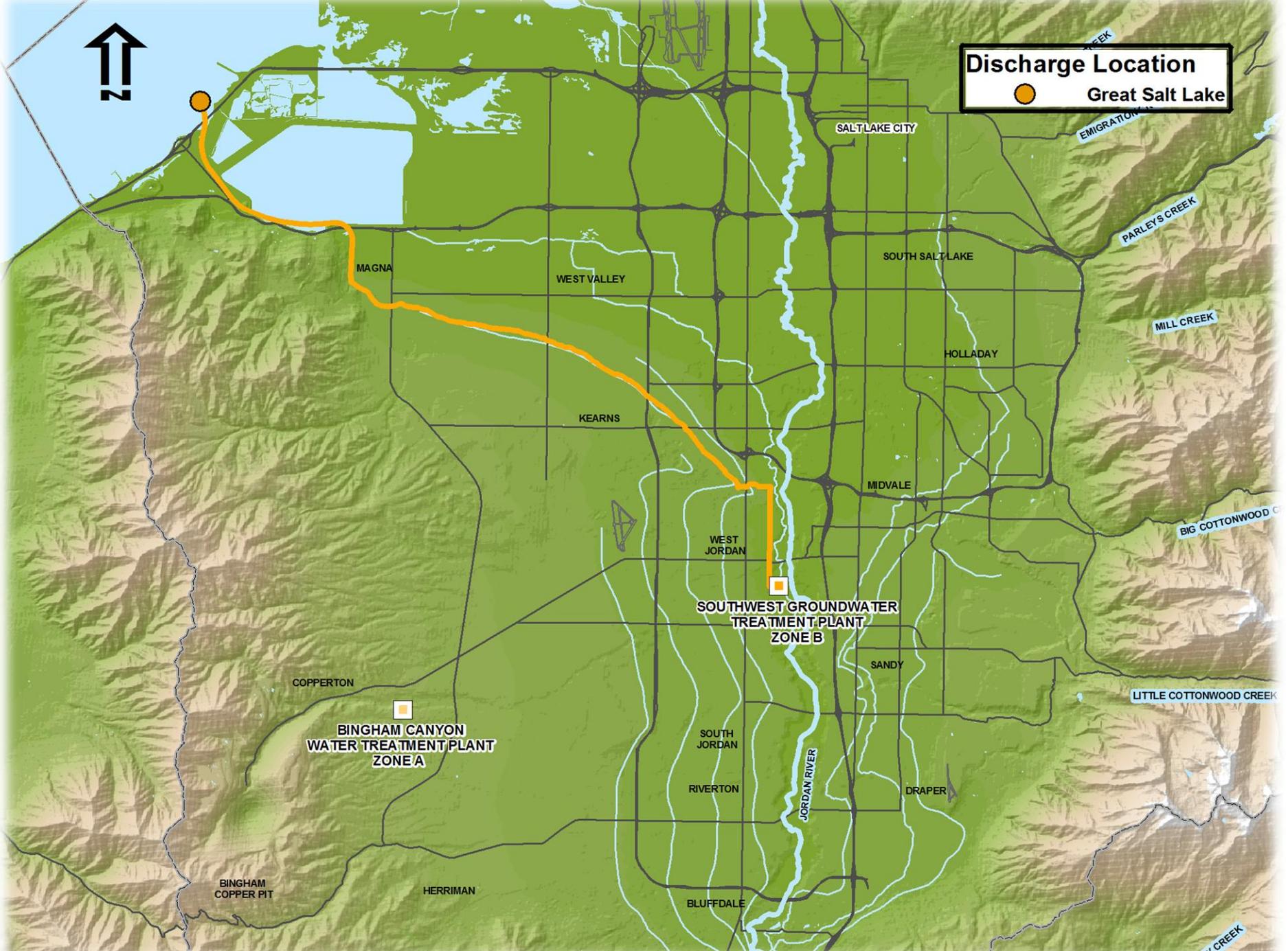
South Jordan Canal

Jordan River



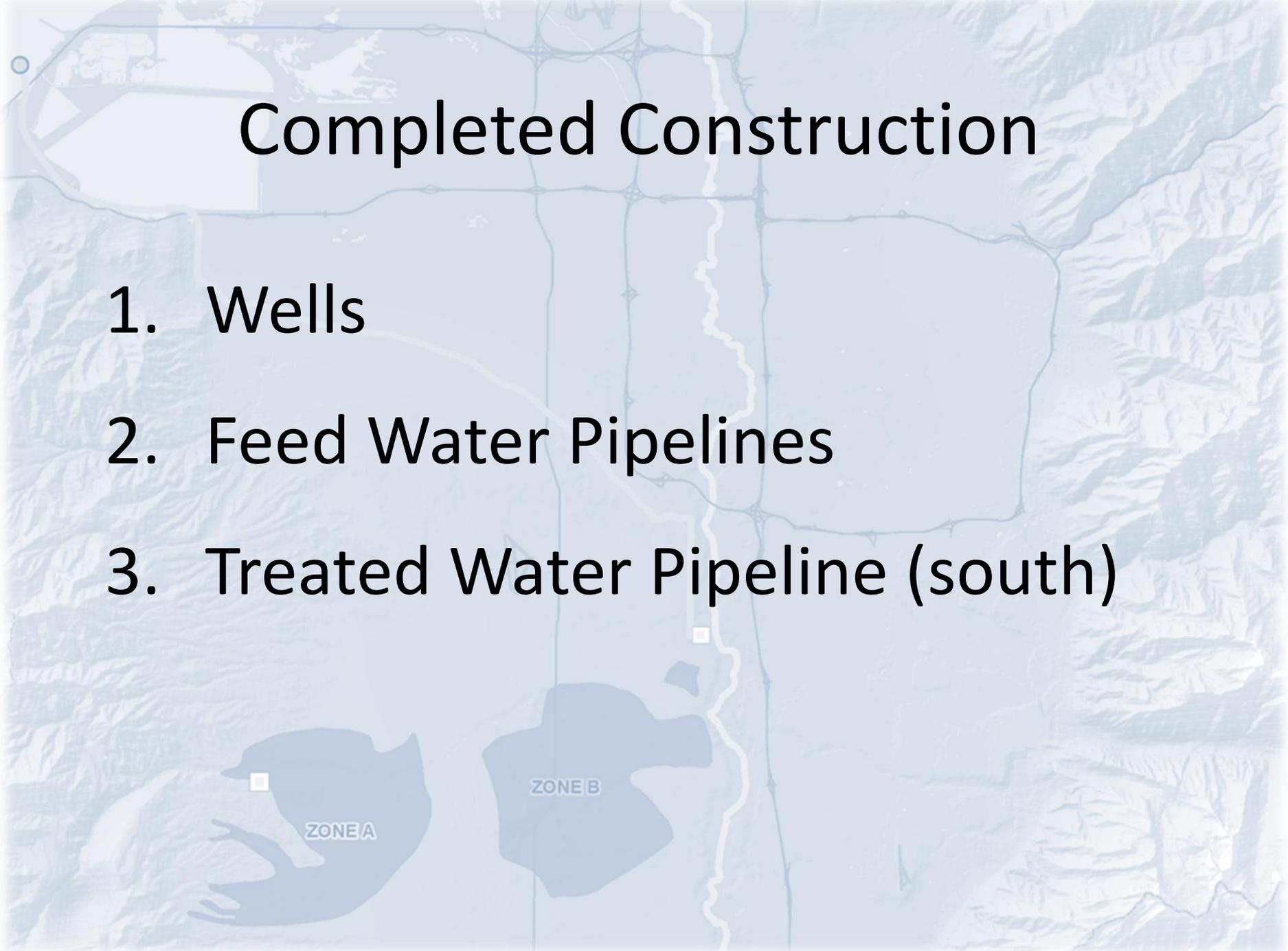


**Discharge Location**  
● Great Salt Lake



# Completed Construction

1. Wells
2. Feed Water Pipelines
3. Treated Water Pipeline (south)

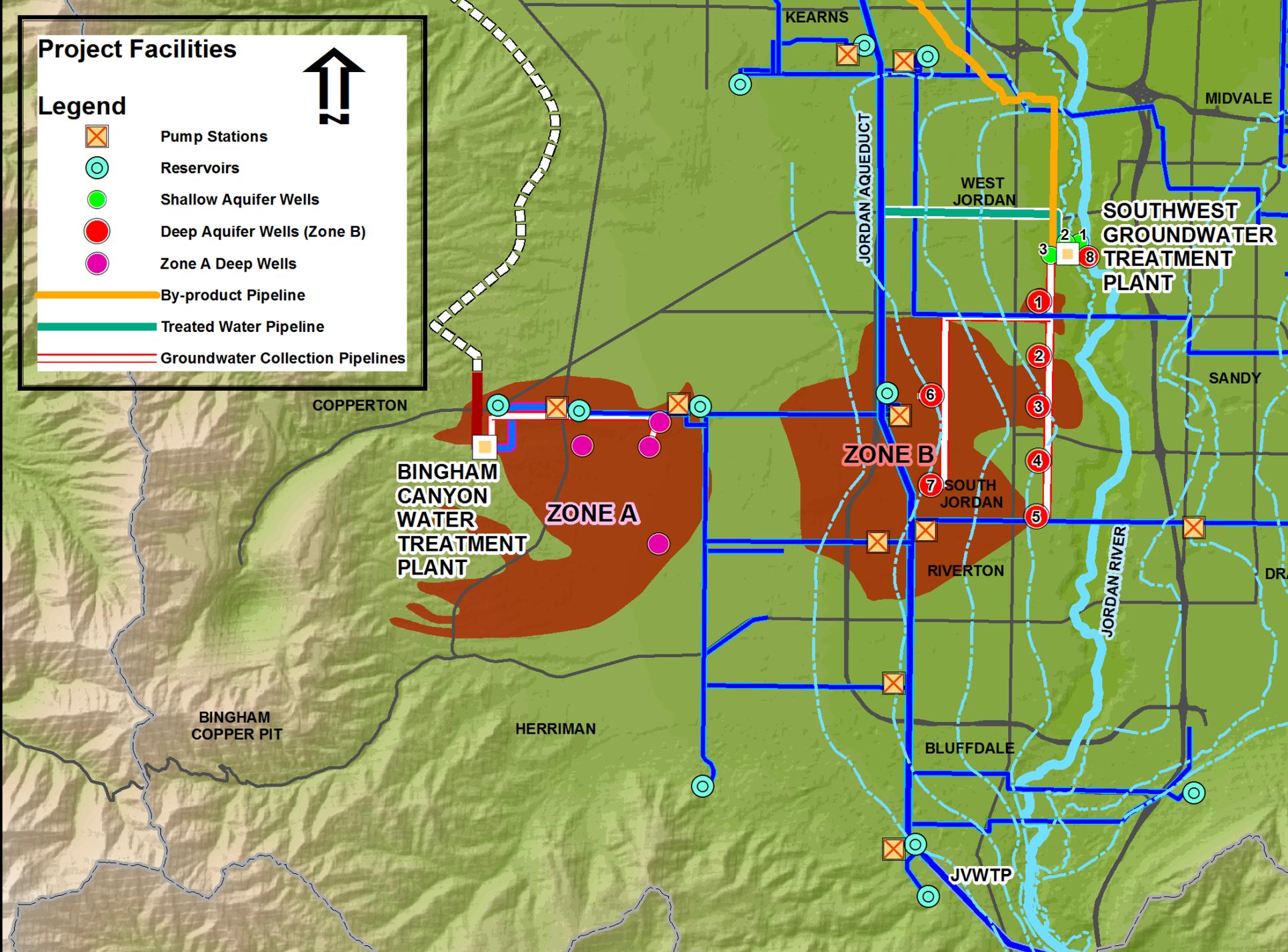


# Project Facilities



## Legend

-  Pump Stations
-  Reservoirs
-  Shallow Aquifer Wells
-  Deep Aquifer Wells (Zone B)
-  Zone A Deep Wells
-  By-product Pipeline
-  Treated Water Pipeline
-  Groundwater Collection Pipelines



COPPERTON

BINGHAM CANYON WATER TREATMENT PLANT

ZONE A

BINGHAM COPPER PIT

HERRIMAN

KEARNS

JORDAN AQUEDUCT

WEST JORDAN

MIDVALE

SOUTHWEST GROUNDWATER TREATMENT PLANT

SANDY

ZONE B

SOUTH JORDAN

RIVERTON

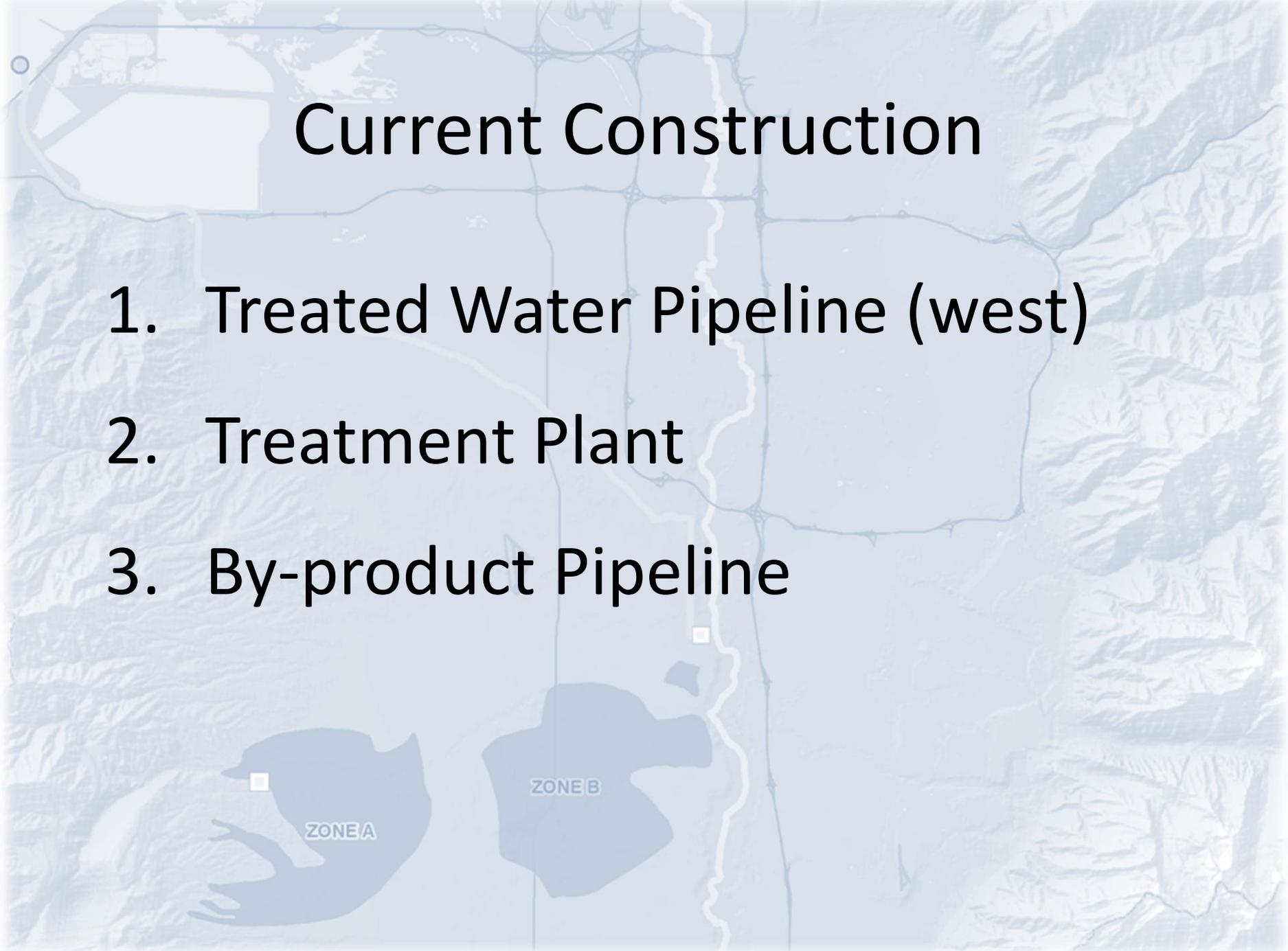
JORDAN RIVER

BLUFFDALE

JVVWTP

# Current Construction

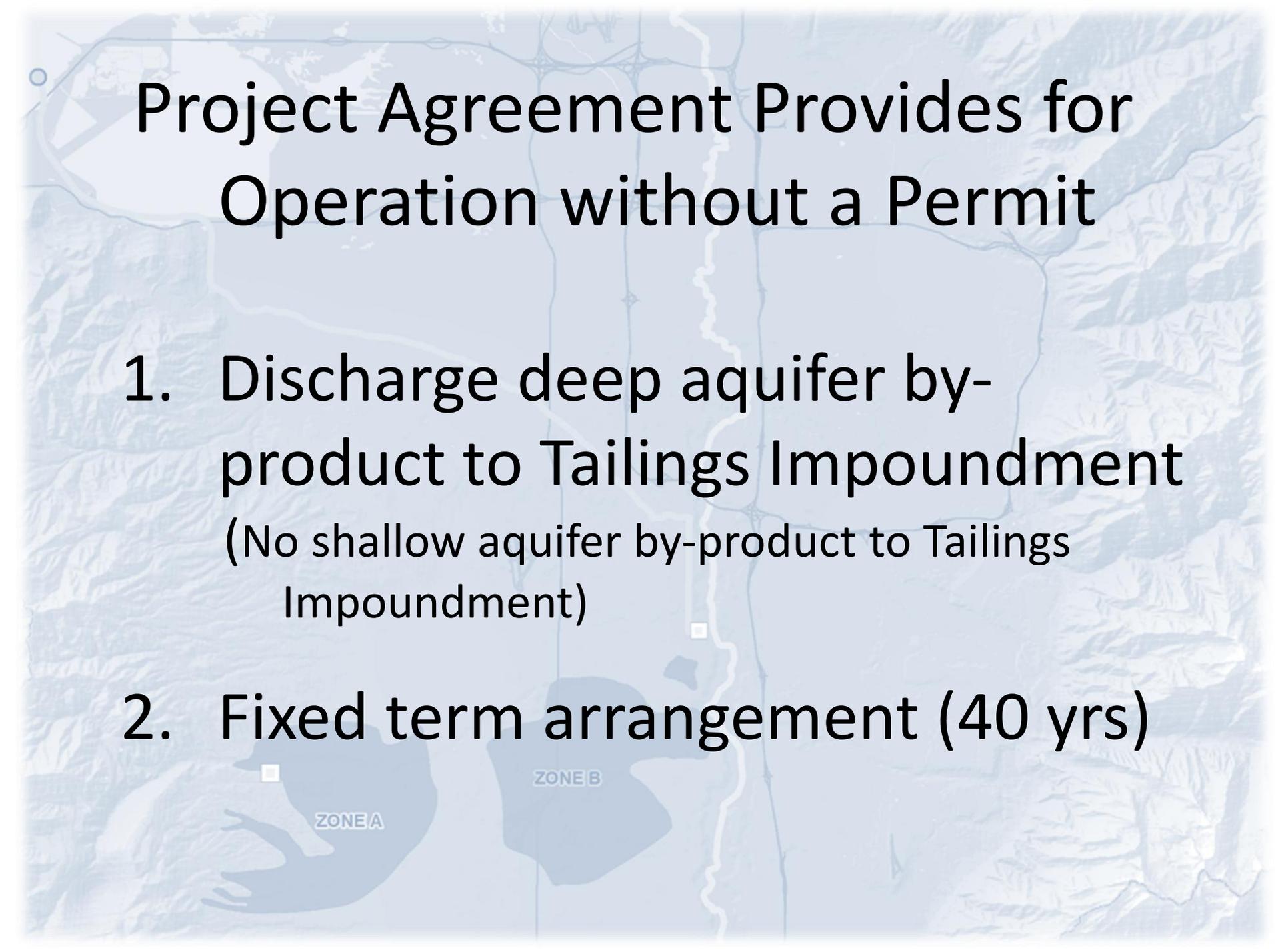
1. Treated Water Pipeline (west)
2. Treatment Plant
3. By-product Pipeline



# Construction Prior to Permit Issuance

1. Project agreements have a completion requirement date (2012)
2. 1/3 of the project can be operated without the permit

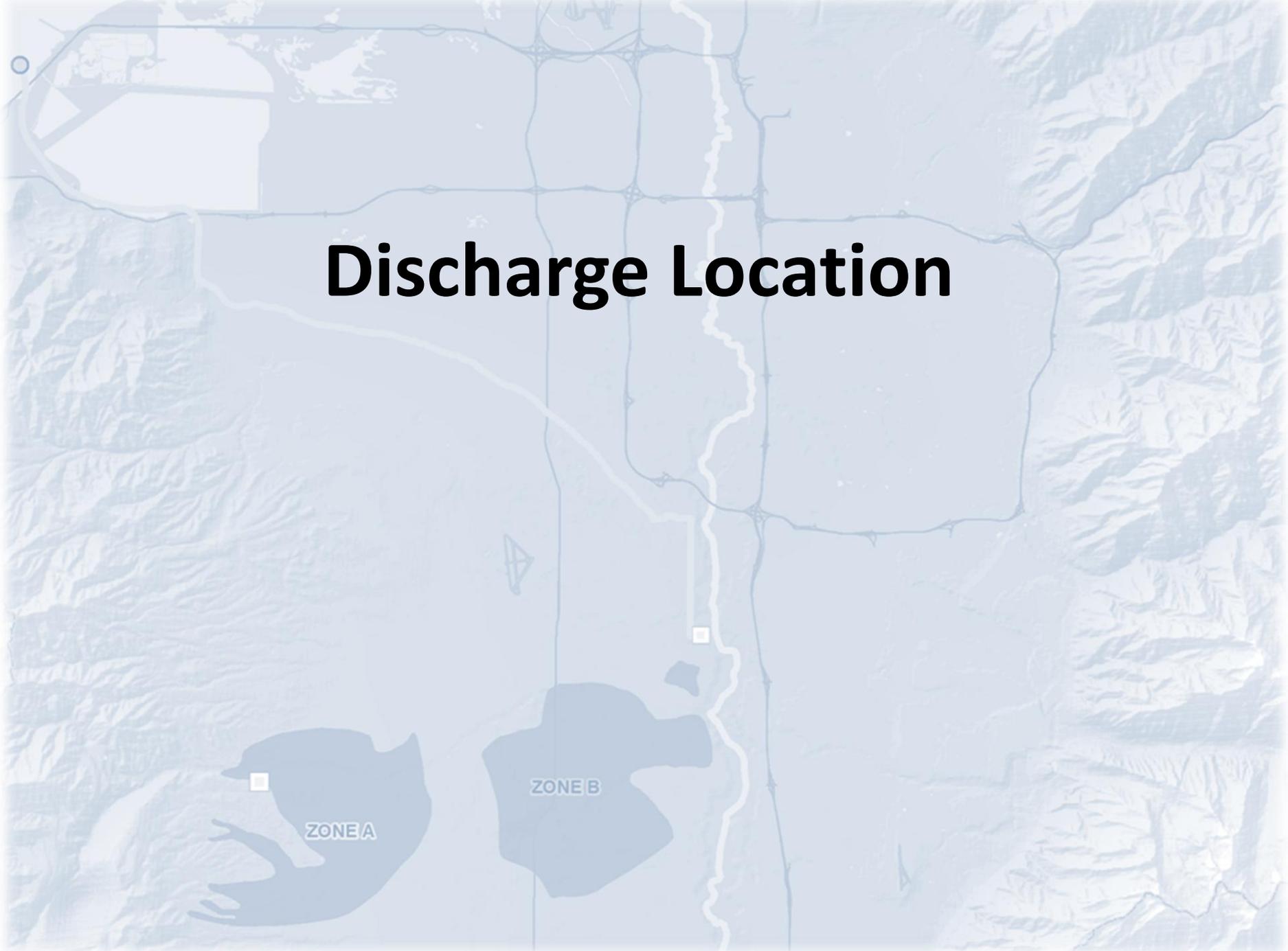


A topographic map of a region with a river and several impoundments. Two areas are labeled 'ZONE A' and 'ZONE B'. A large impoundment is visible in the lower-left quadrant. The map is overlaid with a semi-transparent blue layer.

# Project Agreement Provides for Operation without a Permit

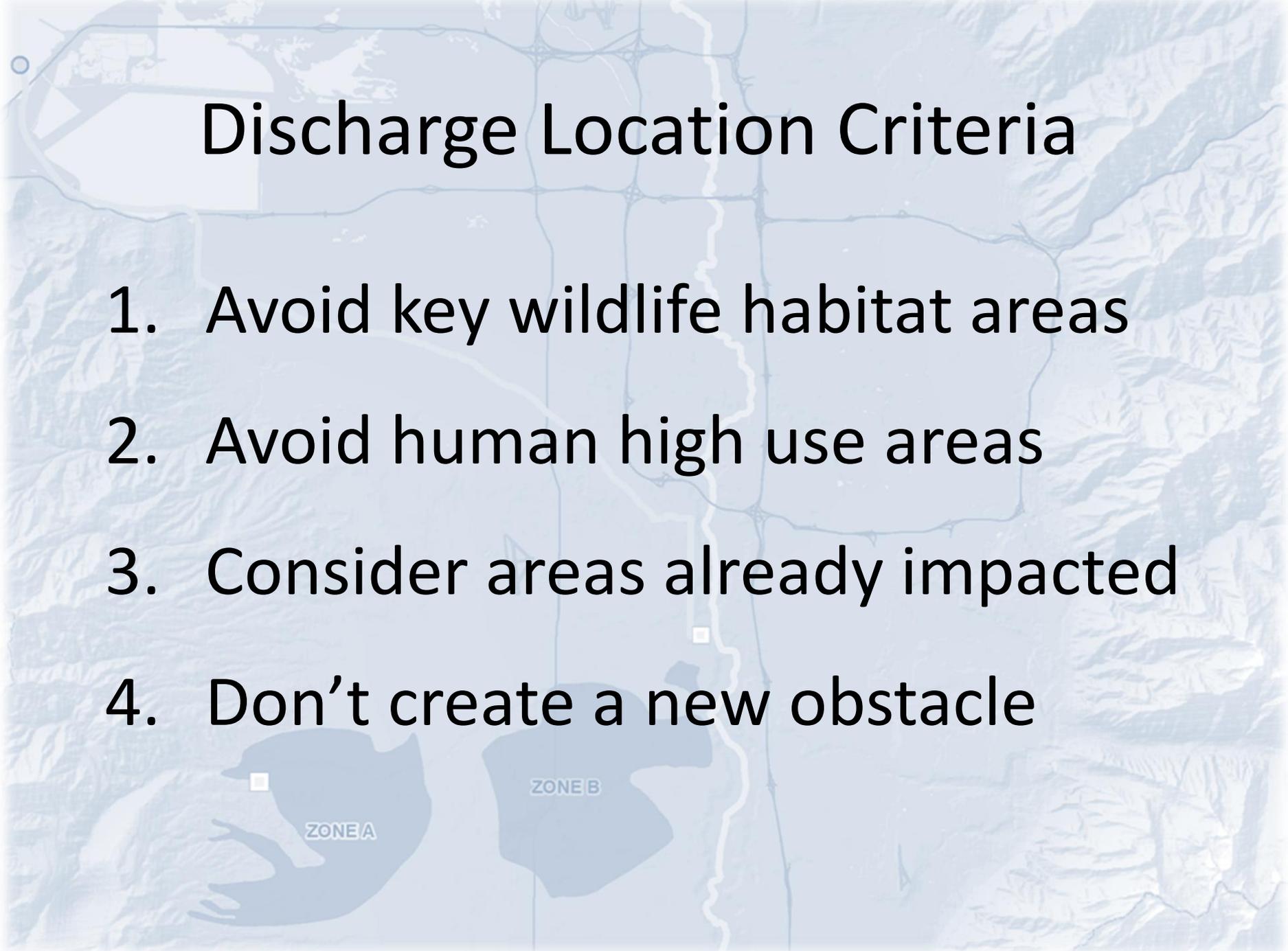
1. Discharge deep aquifer by-product to Tailings Impoundment  
(No shallow aquifer by-product to Tailings Impoundment)
2. Fixed term arrangement (40 yrs)

# Discharge Location

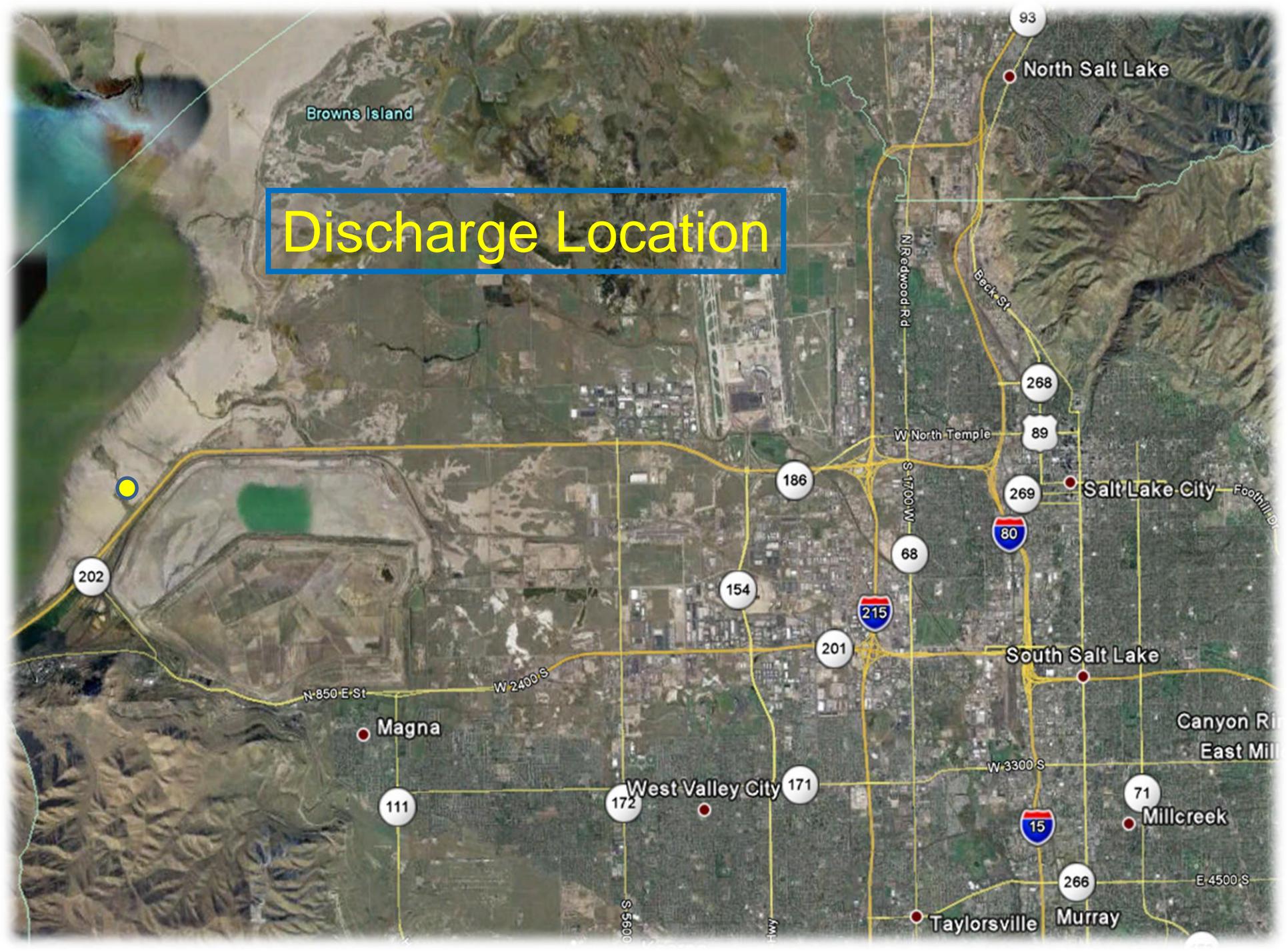


# Discharge Location Criteria

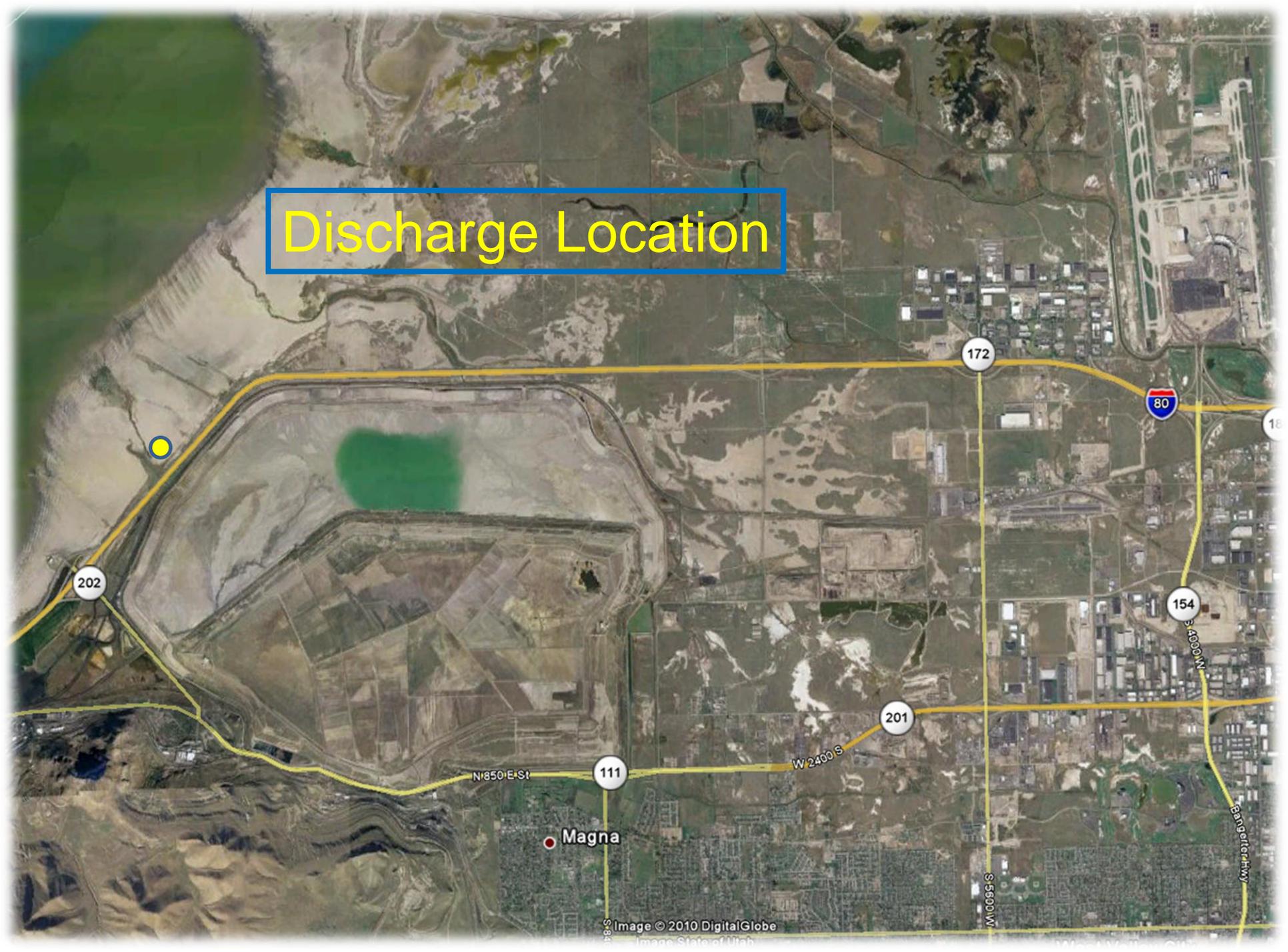
1. Avoid key wildlife habitat areas
2. Avoid human high use areas
3. Consider areas already impacted
4. Don't create a new obstacle



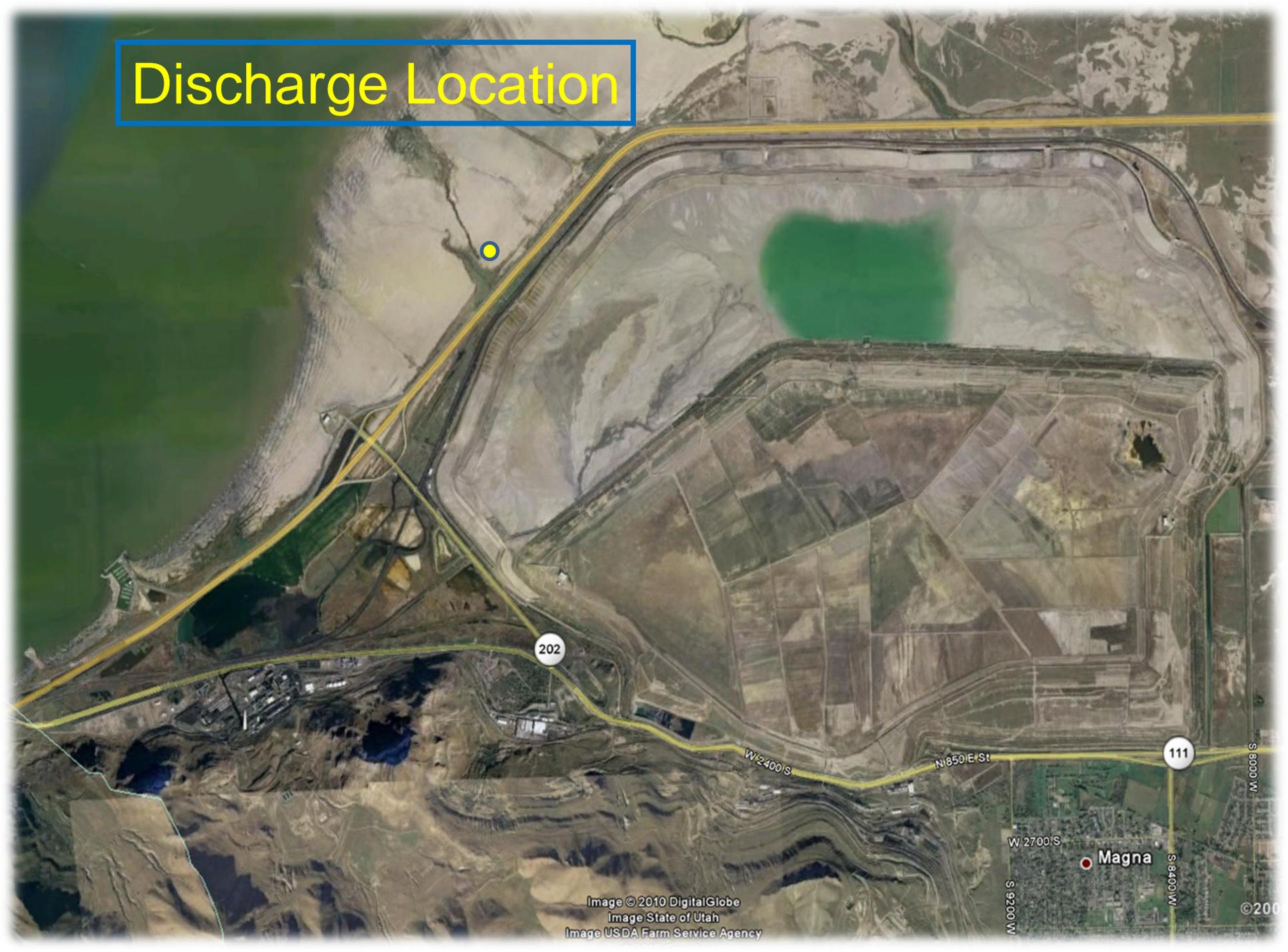
# Discharge Location



# Discharge Location



# Discharge Location



202

W 2400 S

N 850 E St

111

W 2700 S

Magna

S 8400 W

S 9200 W

Discharge Location

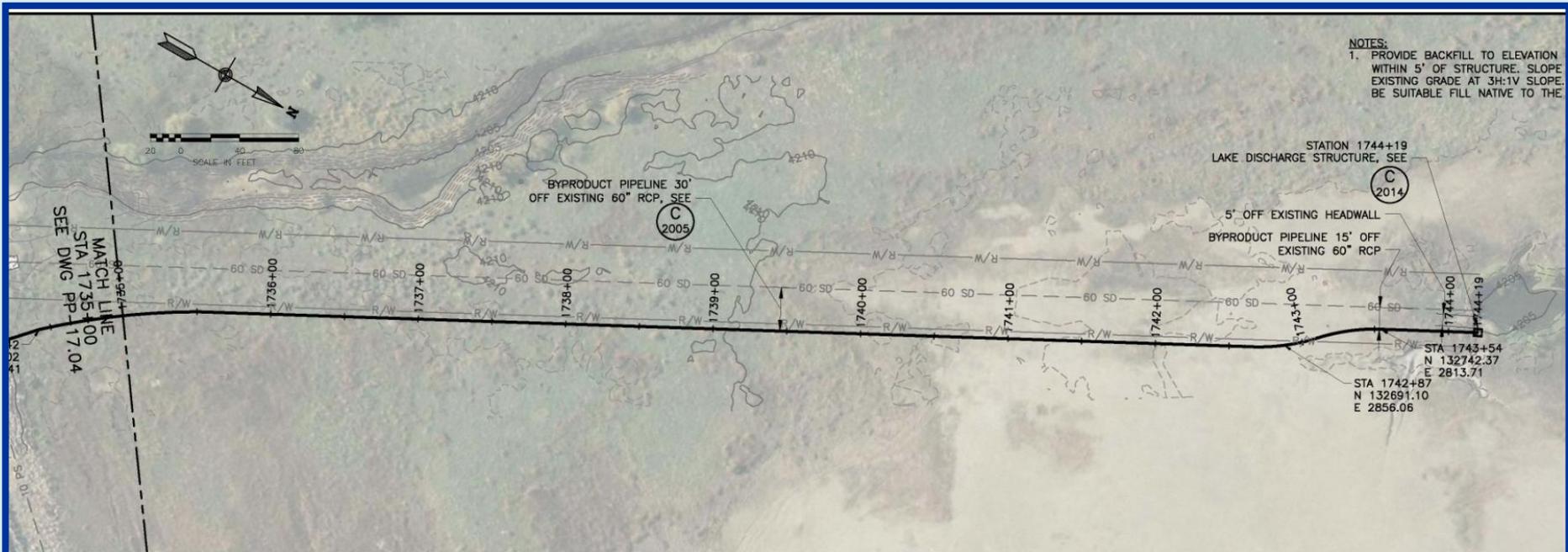


202



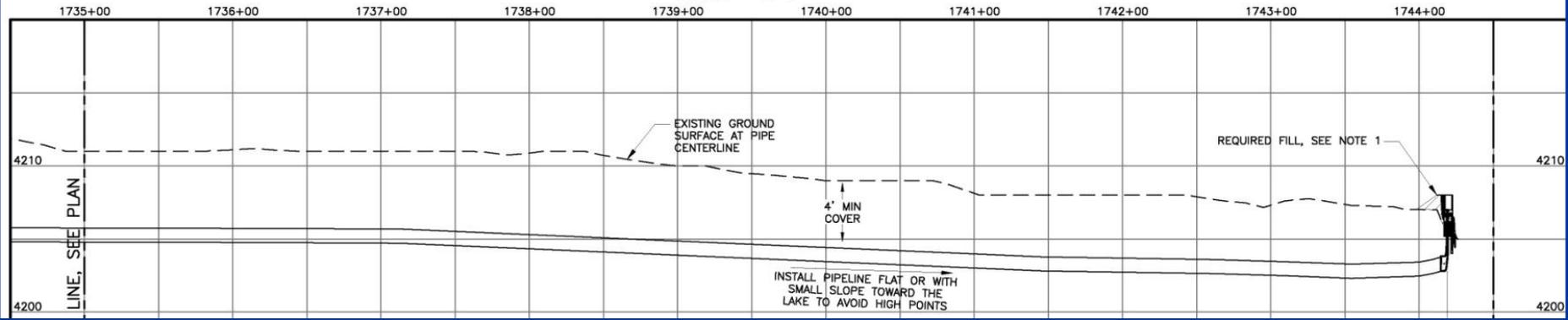
An aerial photograph showing a river delta. The river flows from the top center towards the bottom right, where it branches into several channels. A yellow dot is placed on one of the channels, indicating a discharge location. To the right of the river, there is a large, rectangular area that appears to be a reservoir or a large-scale agricultural project. The surrounding land is a mix of light brown and green, suggesting a semi-arid or agricultural landscape. A blue box with yellow text is overlaid on the left side of the image.

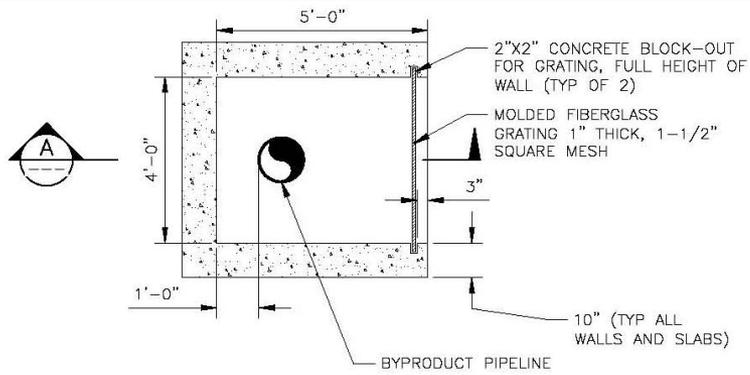
Discharge Location



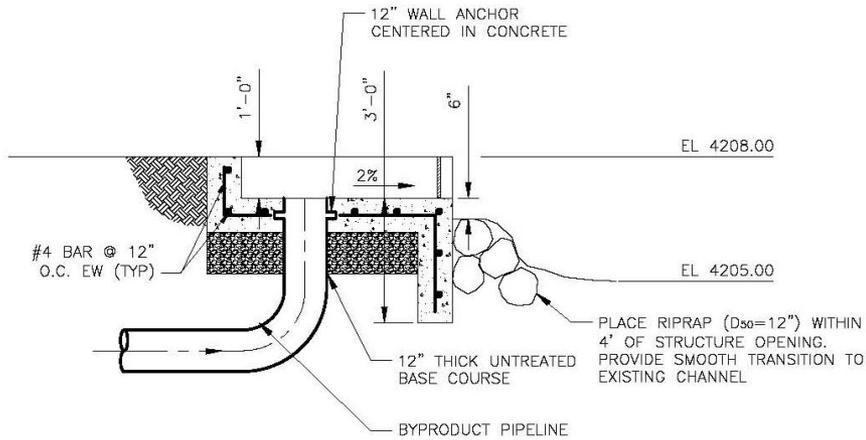
NOTES:  
 1. PROVIDE BACKFILL TO ELEVATION WITHIN 5' OF STRUCTURE. SLOPE EXISTING GRADE AT 3H:1V SLOPE. BE SUITABLE FILL NATIVE TO THE

**PLAN**  
 SCALE: 1" = 40'-0"





PLAN



SECTION - A

# End of Pipeline – Discharge Structure

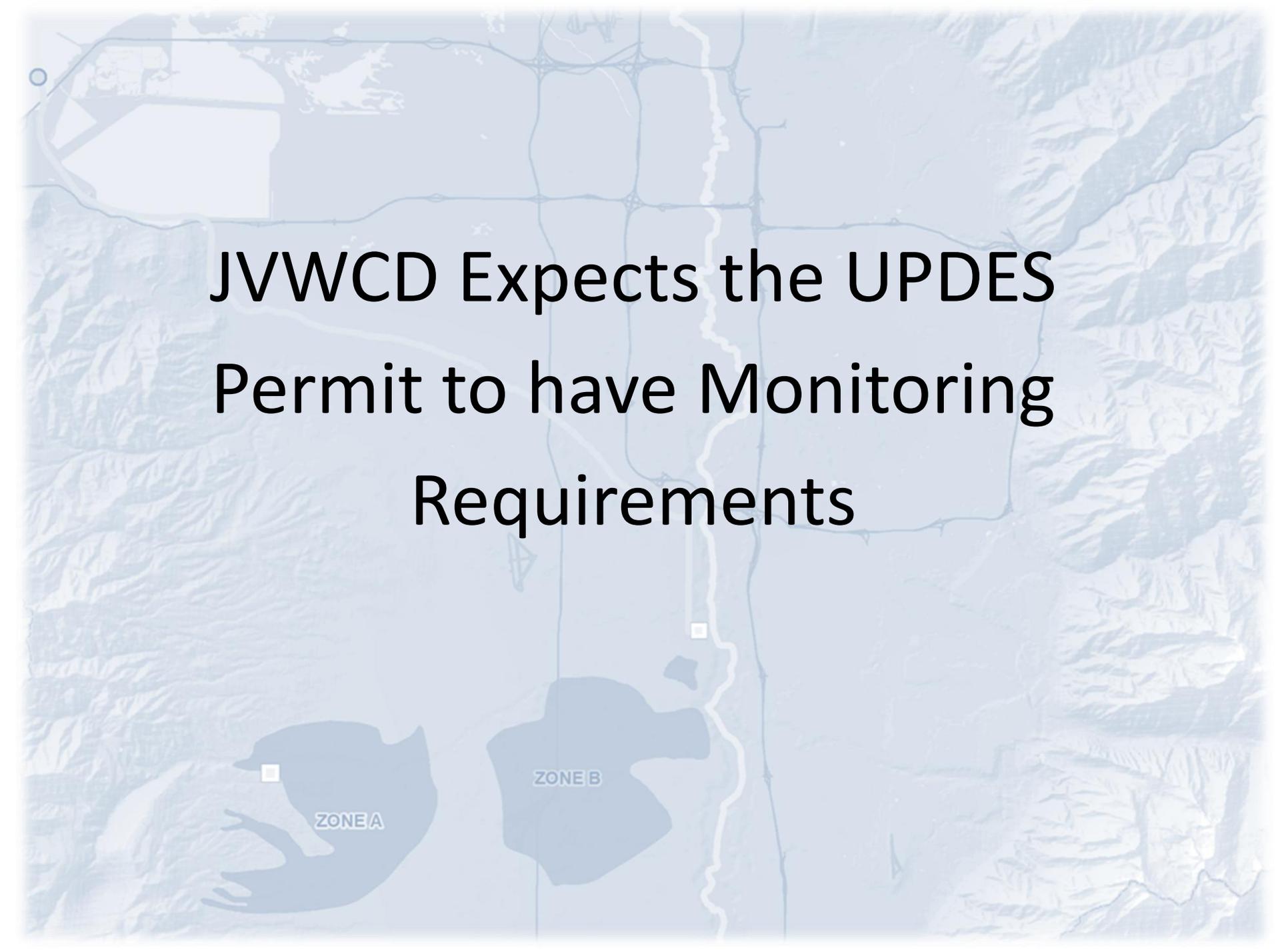
LAKE DISCHARGE  
STRUCTURE

1/2" = 1'-0"

C  
2014

# Monitoring Expectation



A topographic map of a region with a river network and two shaded areas labeled 'ZONE A' and 'ZONE B'. The map is overlaid with a grid of roads and a river. The text 'JVWCD Expects the UPDES Permit to have Monitoring Requirements' is centered over the map.

# JVWCD Expects the UPDES Permit to have Monitoring Requirements

ZONE A

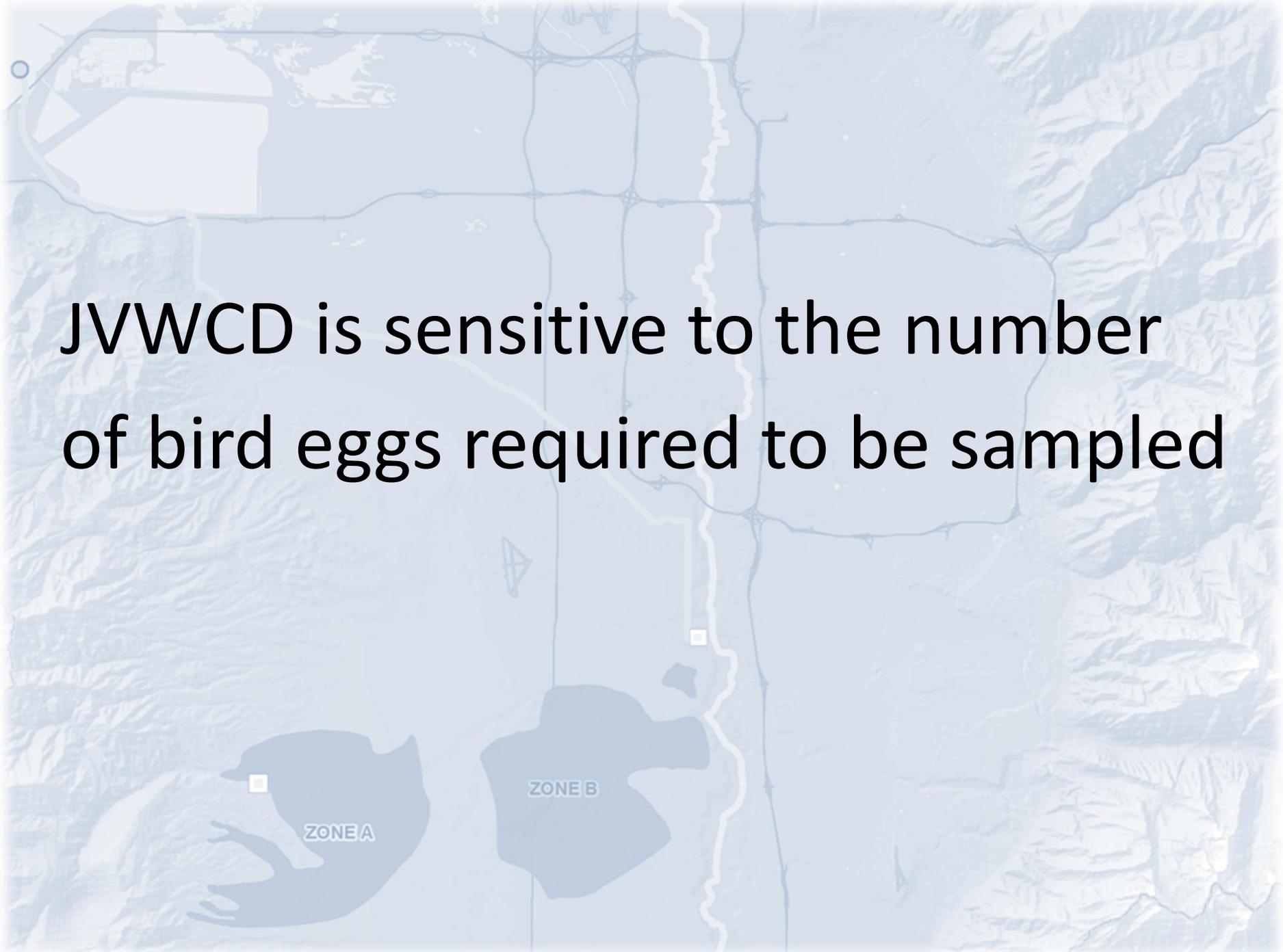
ZONE B

# Monitoring Likely to Include:

- Water Quality
- Invertebrates
- Bird Eggs



JVWCD is sensitive to the number of bird eggs required to be sampled

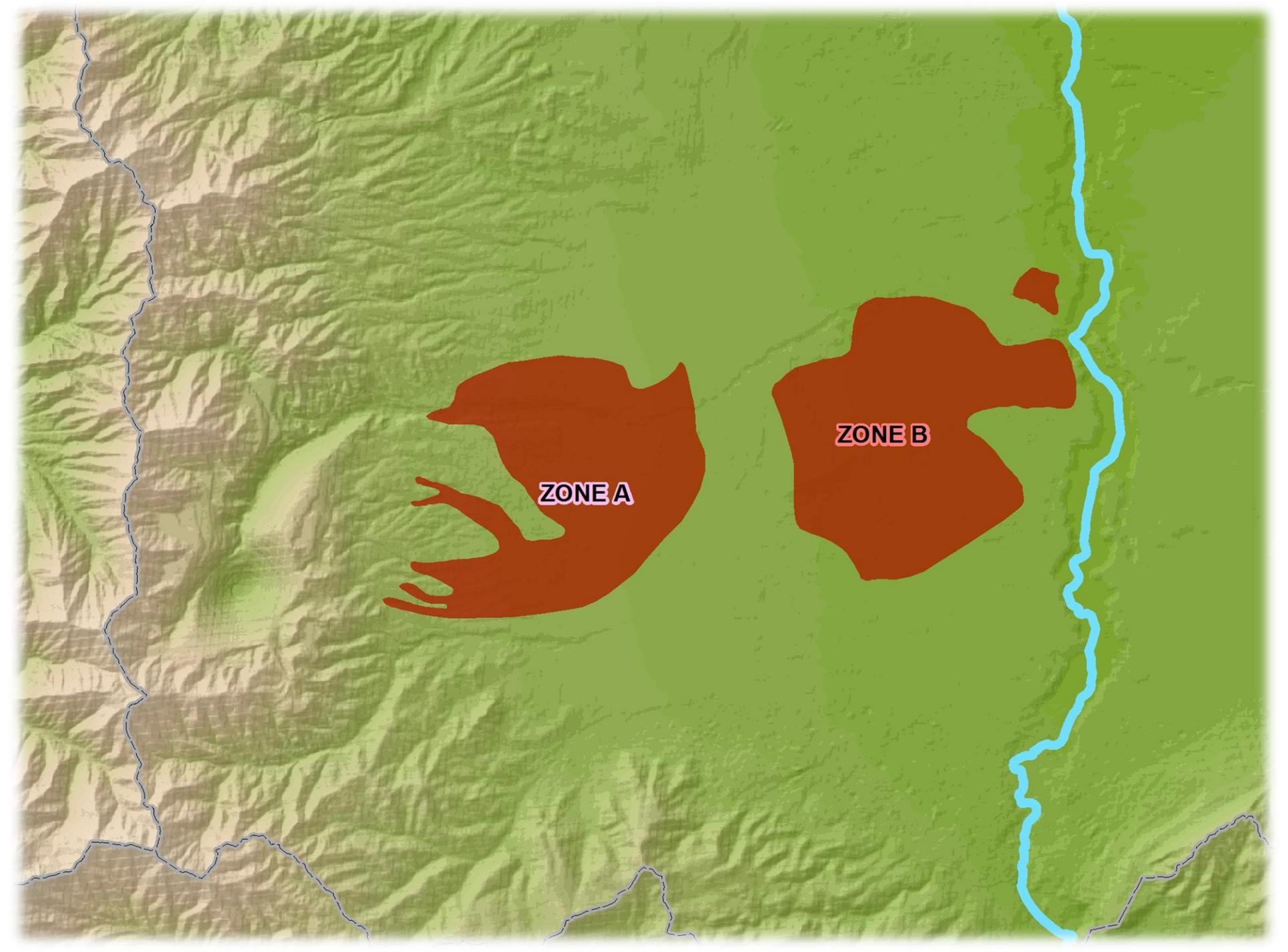


# Summary



# Problem – Unusable Groundwater





**ZONE A**

**ZONE B**

# Solution – Wells and Treatment Plant

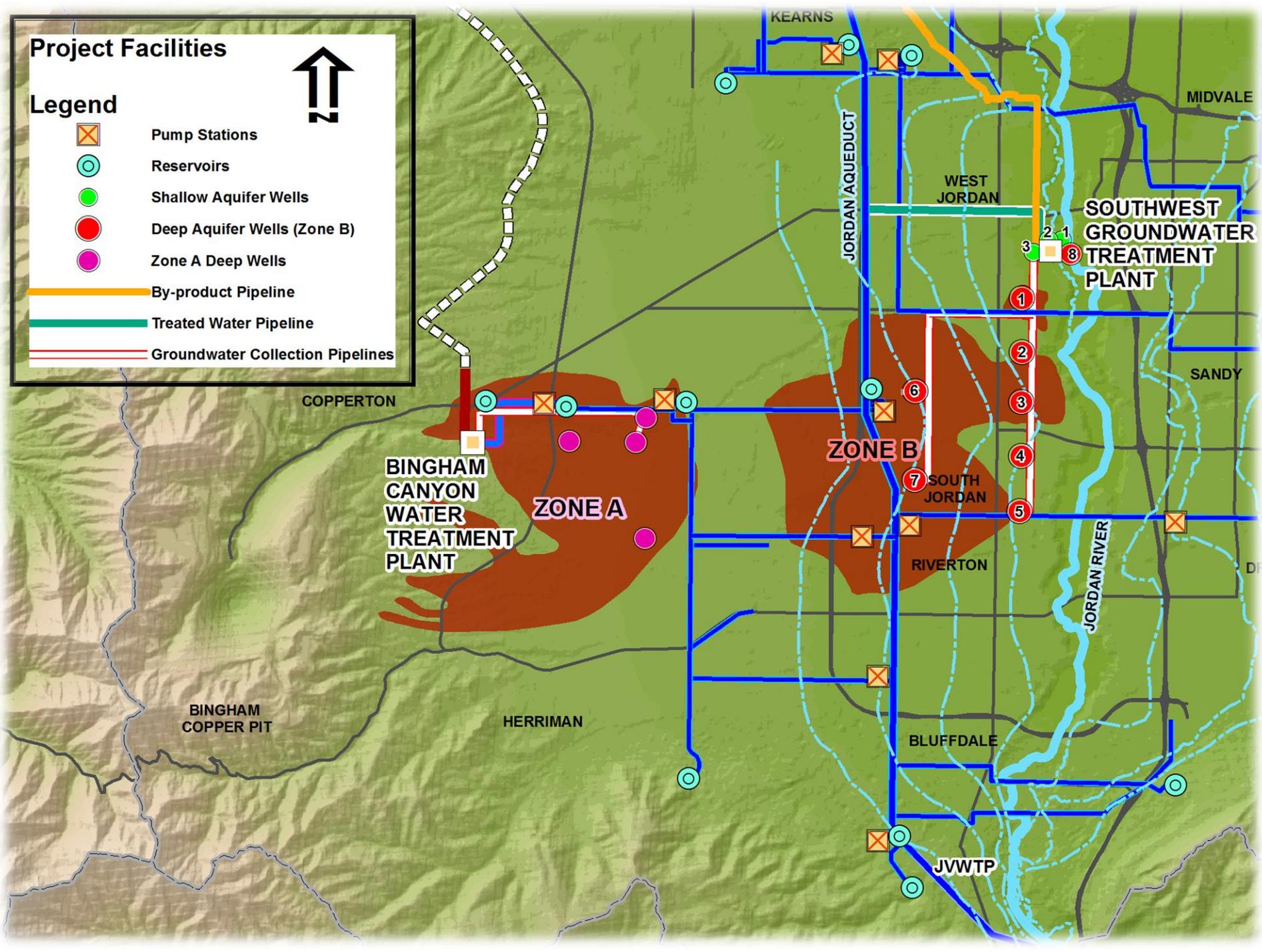


# Project Facilities



## Legend

-  Pump Stations
-  Reservoirs
-  Shallow Aquifer Wells
-  Deep Aquifer Wells (Zone B)
-  Zone A Deep Wells
-  By-product Pipeline
-  Treated Water Pipeline
-  Groundwater Collection Pipelines

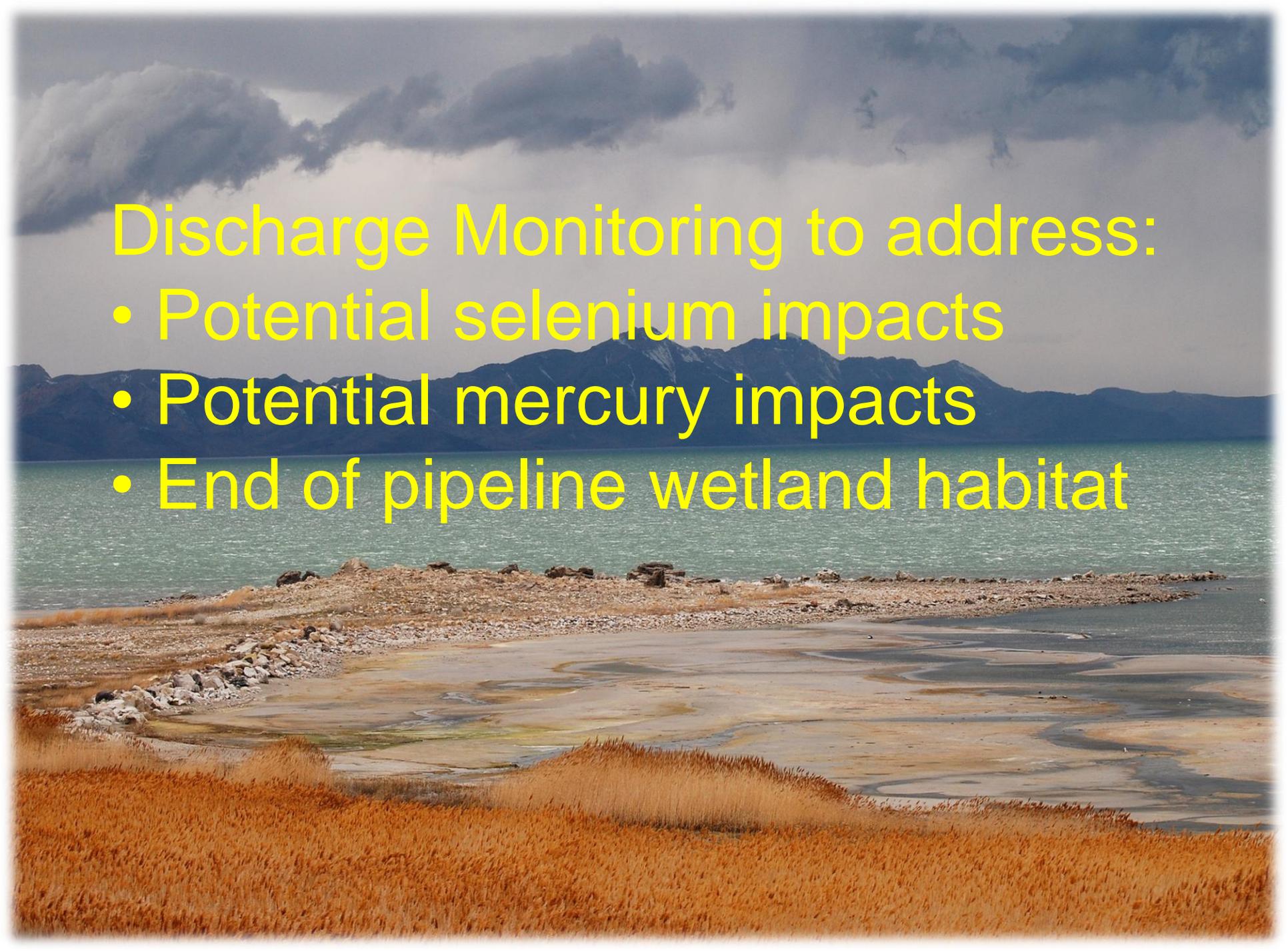


By-product –  
Discharge will be Monitored



An aerial photograph showing a river delta. The river flows from the top center towards the bottom right, where it meets a large body of water. The delta is characterized by numerous distributaries and a complex network of channels. A yellow dot is placed on one of the distributaries, indicating a specific location. A blue-bordered box with yellow text is overlaid on the left side of the image. The terrain is mostly flat and light-colored, suggesting a sandy or silty environment. In the bottom right corner, there are some rectangular structures, possibly agricultural fields or industrial sites.

Discharge Location



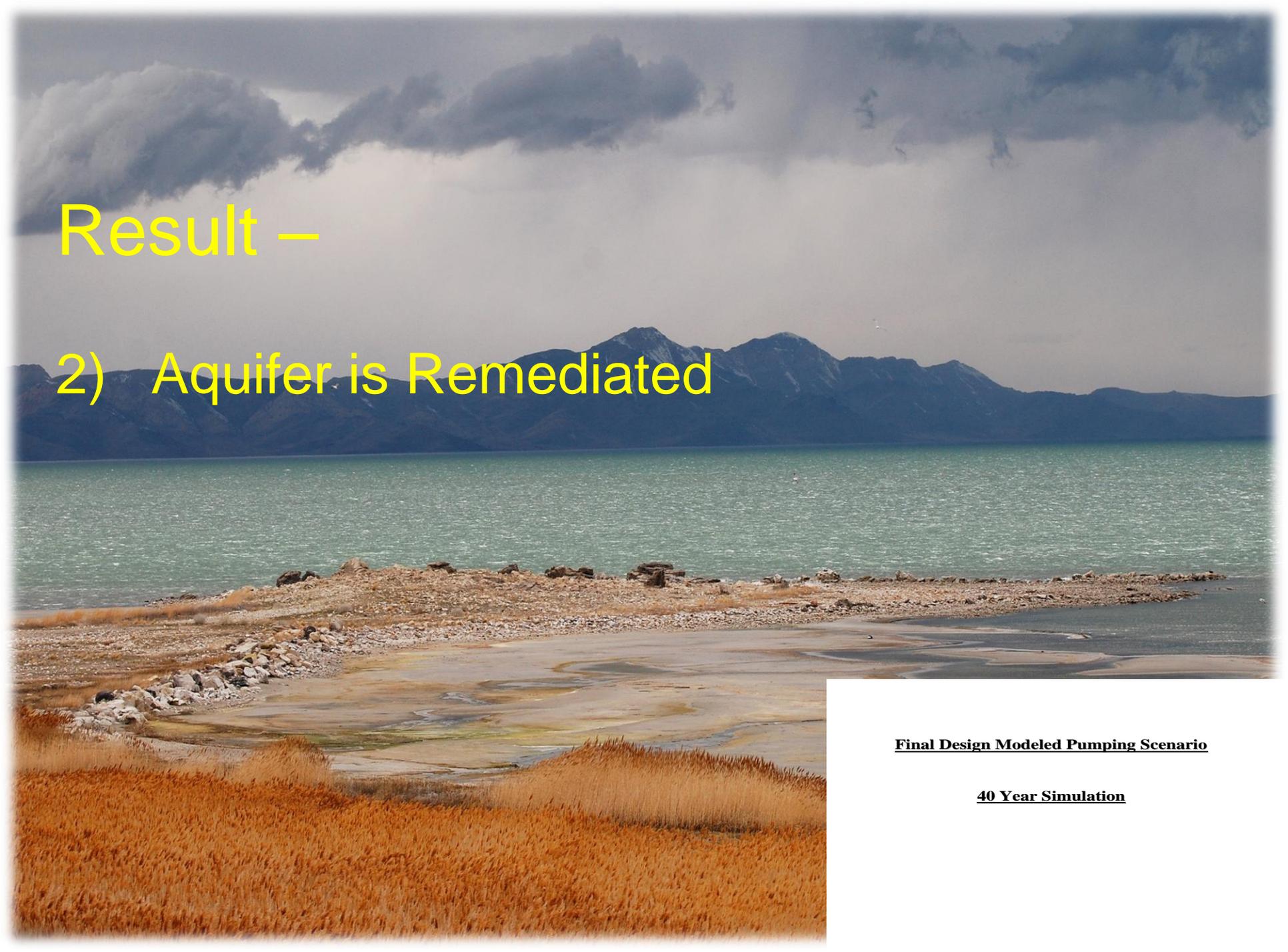
## Discharge Monitoring to address:

- Potential selenium impacts
- Potential mercury impacts
- End of pipeline wetland habitat



Result –

1) Hundreds of Drinking Water Wells Protected



Result –

2) Aquifer is Remediated

**Final Design Modeled Pumping Scenario**

**40 Year Simulation**

A woman is shown in profile, drinking water from a clear blue plastic bottle. The background is a scenic landscape featuring a large body of water, likely a reservoir or lake, with mountains in the distance under a blue sky with some clouds. The foreground shows a rocky shoreline with some dry grass.

Result –

3) New Water Supply Produced for the Public



SOUTHWEST  
**GROUNDWATER**  
TREATMENT PLANT

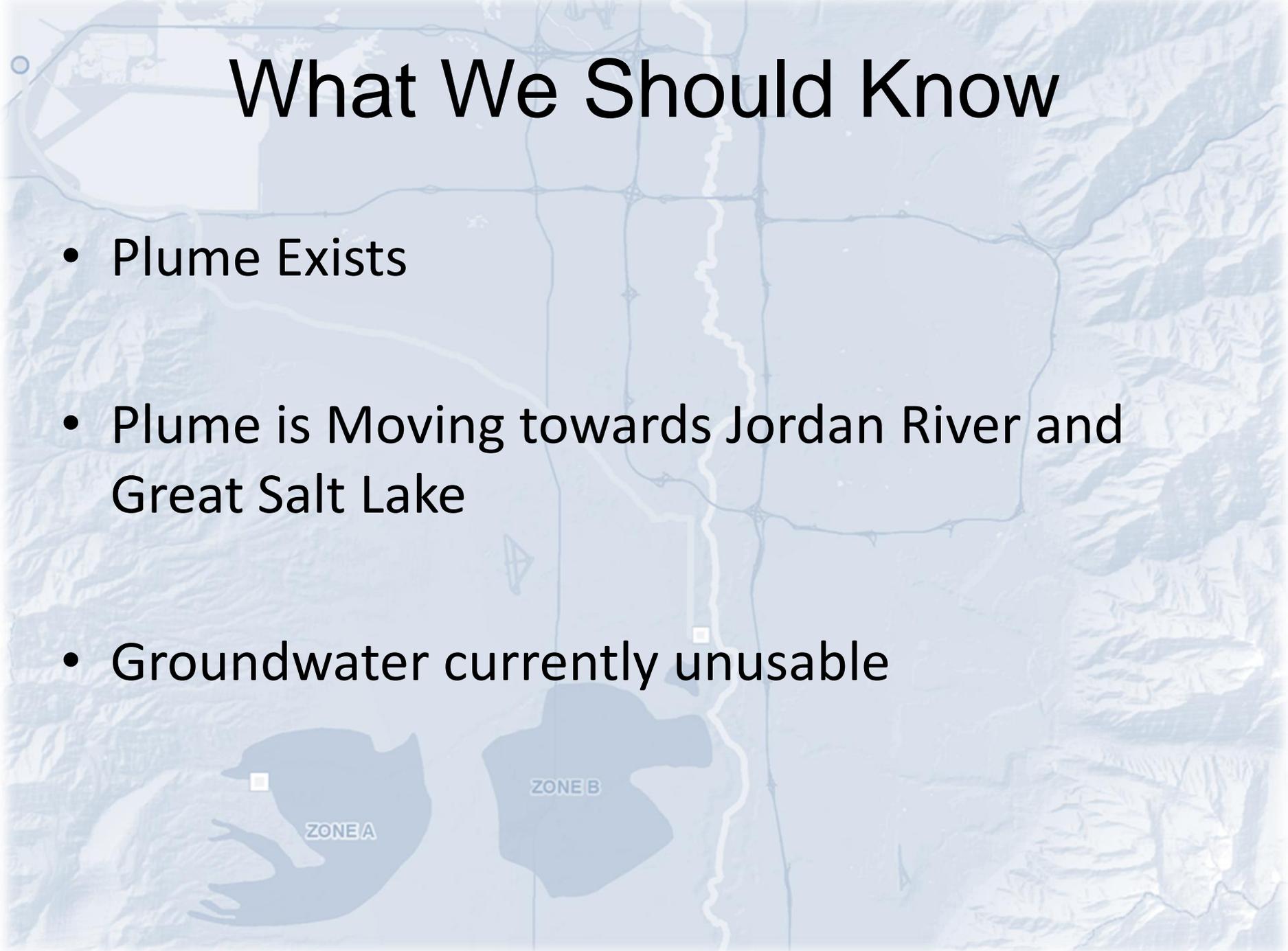


JORDAN VALLEY WATER  
CONSERVANCY DISTRICT

*Delivering Quality Every Day*

# What We Should Know

- Plume Exists
- Plume is Moving towards Jordan River and Great Salt Lake
- Groundwater currently unusable

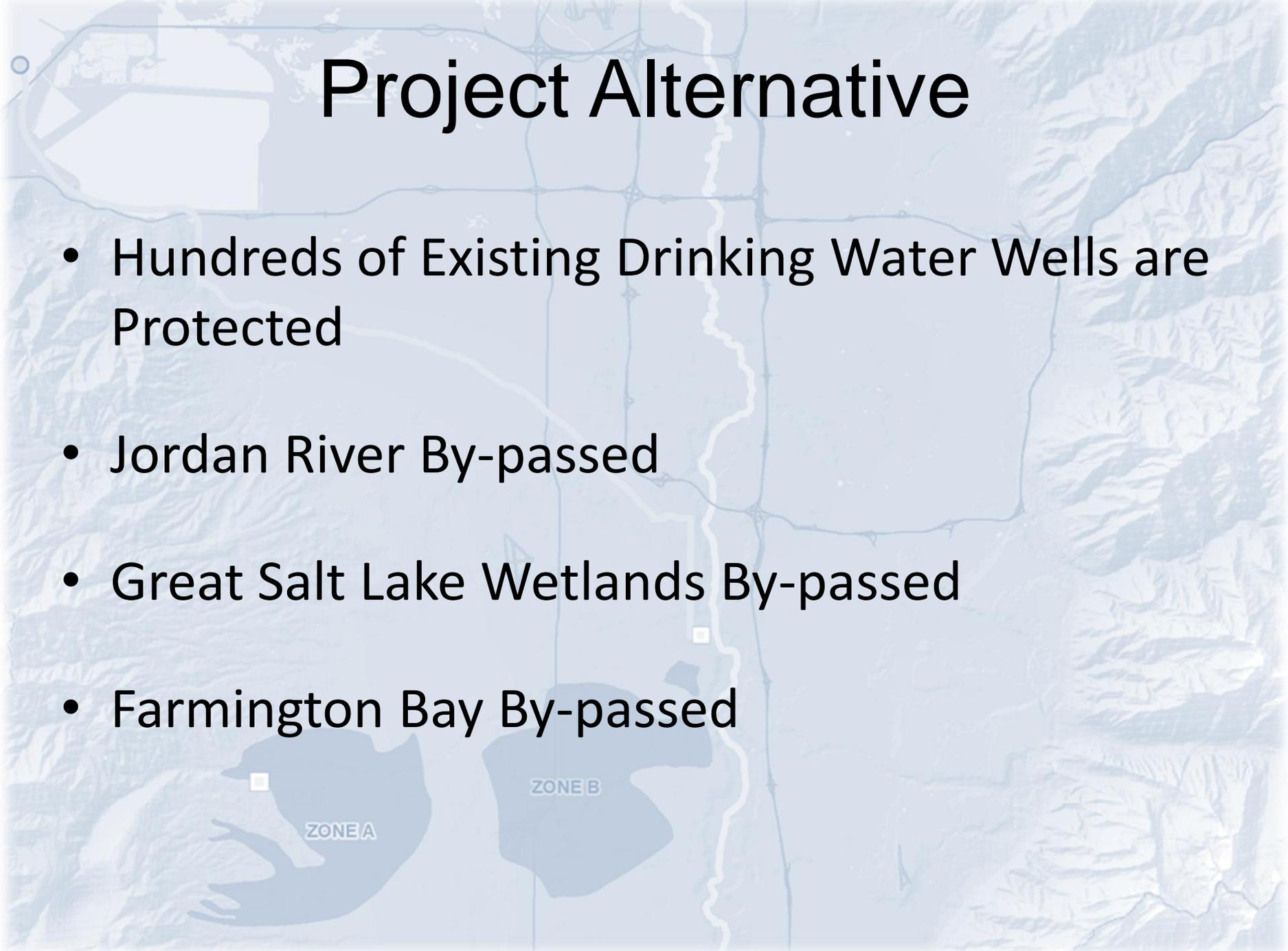


# Do Nothing Alternative

- Plume Migrates into Hundreds of Existing Drinking Water Wells
- Plume Migrates into Jordan River
- Plume Migrates into Great Salt Lake Wetlands
- Plume Migrates into Farmington Bay
- Plume Migrates into Great Salt Lake

# Project Alternative

- Hundreds of Existing Drinking Water Wells are Protected
- Jordan River By-passed
- Great Salt Lake Wetlands By-passed
- Farmington Bay By-passed



# JVWCD Web Site

- Google “Jordan Valley Water”

- [www.jvwcd.org](http://www.jvwcd.org)

- Click on logo



**JORDAN VALLEY WATER**  
CONSERVANCY DISTRICT  
*Delivering Quality Every Day*

Home About Water Customers News Projects Employment Contact

### Everything Relies on Water

**Conservation Garden Park**  
The Conservation Garden Park showcases beautiful, water-wise landscapes ideal for northern Utah.

**Conservation Programs at Jordan Valley Water**  
Learn about Jordan Valley Water's conservation programs and how you can participate.

**About JVWCD**  
Jordan Valley Water Conservancy District is primarily a wholesaler of water, serving much of Salt Lake County and other areas. [Learn More](#)

**Customer Service**  
Retail customers can pay bills and find other service options that are available. [Learn More](#) | [FAQ's](#)

**Calendar**  
**FREE Landscape Class**  
*Tree Care and Pruning Workshop*  
Sat Mar 20 from 10:00A-11:00A

**FREE Landscape Class**  
*Reduce, Replant, Relax: Redesigning Landscapes to be Waterwise*  
Sat Mar 27 from 10:00A-11:00A

**Conservation Committee Meeting**  
*April CCM*  
Mon Apr 12 from 3:00P-3:45P

[<< View Calendar >>](#)

### Delivering Quality Every Day

**Water**  
Get information on our high quality water.

**Member Agencies**  
Information and resources for and about our member agencies.

**Financial**  
View budget information, financial statements, and bond ratings.

**Engineering Projects**  
Learn about our many projects and how to participate.

**Board**  
Learn about board meetings and your nine board member representatives.

**News & Publications**  
View press releases, annual reports, conservation brochures, and other publications.

**SOUTHWEST JORDAN VALLEY GROUNDWATER PROJECT**



JORDAN VALLEY WATER  
CONSERVANCY DISTRICT

*Delivering Quality Every Day*